

MotionFX Software Library

MotionFX Software Library Documentation

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Modules

Here is a list of all modules:

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▼ **MIDDLEWARES**

 ▼ **MOTION_FX**

[MOTION_FX_Exported_Types](#)

[MOTION_FX_Exported_Functions](#)

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MOTION_FX

Detailed Description

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MOTION_FX

MIDDLEWARES

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MOTION_FX_Exported_Types

MOTION_FX_Exported_Functions

Detailed Description

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MOTION_FX_Exported_Types

[MIDDLEWARES](#) » [MOTION_FX](#)

Data Structures

```
struct MFX_knobs_t
```

```
struct MFX_input_t
```

```
struct MFX_output_t
```

```
struct MFX_MagCal_input_t
```

```
struct MFX_MagCal_output_t
```

Macros

```
#define MFX_NUM_AXES 3
```

```
#define MFX_QNUM_AXES 4
```

Enumerations

```
enum MFX_engine_state_t { MFX_ENGINE_DISABLE = 0,  
                         MFX_ENGINE_ENABLE = 1 }
```

```
enum MFX_engine_output_ref_sys {  
    MFX_ENGINE_OUTPUT_NED = 0,  
    MFX_ENGINE_OUTPUT_ENU = 1 }
```

```
enum MFX_MagCal_quality_t { MFX_MAGCALUNKNOWN = 0,  
                            MFX_MAGCALPOOR, MFX_MAGCALOK,  
                            MFX_MAGCALGOOD }
```

Detailed Description

Macro Definition Documentation

#define MFX_NUM_AXES 3

Definition at line [62](#) of file [motion_fx.h](#).

#define MFX_QNUM_AXES 4

Definition at line [63](#) of file [motion_fx.h](#).

Enumeration Type Documentation

enum MFX_engine_output_ref_sys

Enumerator

| | |
|-----------------------|--|
| MFX_ENGINE_OUTPUT_NED | |
| MFX_ENGINE_OUTPUT_ENU | |

Definition at line [72](#) of file **motion_fx.h**.

enum MFX_engine_state_t

Enumerator

| | |
|--------------------|--|
| MFX_ENGINE_DISABLE | |
| MFX_ENGINE_ENABLE | |

Definition at line [66](#) of file **motion_fx.h**.

enum MFX_MagCal_quality_t

Enumerator

| | |
|-------------------|--|
| MFX_MAGCALUNKNOWN | |
| MFX_MAGCALPOOR | |
| MFX_MAGCALOK | |
| MFX_MAGCALGOOD | |

Definition at line [119](#) of file **motion_fx.h**.

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| Data Structures | Data Structure Index | Data Fields | Data Fields | |
| MFX_knobs_t Struct Reference | | | | |

MIDDLEWARES » **MOTION_FX** » **MOTION_FX_Exported_Types**

```
#include <motion_fx.h>
```

Data Fields

float **ATime**

float **MTime**

float **FrTime**

unsigned char **LMode**

float **gbias_mag_th_sc_6X**

float **gbias_acc_th_sc_6X**

float **gbias_gyro_th_sc_6X**

float **gbias_mag_th_sc_9X**

float **gbias_acc_th_sc_9X**

float **gbias_gyro_th_sc_9X**

unsigned char **modx**

char **acc_orientation**
[MFX_QNUM_AXES]

char **gyro_orientation**
[MFX_QNUM_AXES]

char **mag_orientation**
[MFX_QNUM_AXES]

MFX_engine_output_ref_sys output_type

int **start_automatic_gbias_calculation**

Detailed Description

Definition at line **78** of file [motion_fx.h](#).

Field Documentation

char acc_orientation[MFX_QNUM_AXES]

Definition at line [91](#) of file [motion_fx.h](#).

float ATime

Definition at line [80](#) of file [motion_fx.h](#).

float FrTime

Definition at line [82](#) of file [motion_fx.h](#).

float gbias_acc_th_sc_6X

Definition at line [85](#) of file [motion_fx.h](#).

float gbias_acc_th_sc_9X

Definition at line [88](#) of file [motion_fx.h](#).

float gbias_gyro_th_sc_6X

Definition at line [86](#) of file [motion_fx.h](#).

float gbias_gyro_th_sc_9X

Definition at line [89](#) of file [motion_fx.h](#).

float gbias_mag_th_sc_6X

Definition at line [84](#) of file [motion_fx.h](#).

float gbias_mag_th_sc_9X

Definition at line [87](#) of file [motion_fx.h](#).

char gyro_orientation[MFX_QNUM_AXES]

Definition at line [92](#) of file [motion_fx.h](#).

unsigned char LMode

Definition at line [83](#) of file [motion_fx.h](#).

char mag_orientation[MFX_QNUM_AXES]

Definition at line [93](#) of file [motion_fx.h](#).

unsigned char modx

Definition at line [90](#) of file [motion_fx.h](#).

float MTime

Definition at line [81](#) of file [motion_fx.h](#).

MFX_engine_output_ref_sys output_type

Definition at line **94** of file **motion_fx.h**.

int start_automatic_gbias_calculation

Definition at line **95** of file **motion_fx.h**.

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

- algorithms/Middlewares/ST/STM32_MotionFX_Library/Inc/**motion_1**
-

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| MFX_input_t Struct Reference | | | | | |

MIDDLEWARES » **MOTION_FX** » **MOTION_FX_Exported_Types**

```
#include <motion_fx.h>
```

Data Fields

float **mag [MFX_NUM_AXES]**

float **acc [MFX_NUM_AXES]**

float **gyro [MFX_NUM_AXES]**

Detailed Description

Definition at line **98** of file [motion_fx.h](#).

Field Documentation

float acc[MFX_NUM_AXES]

Definition at line [101](#) of file [motion_fx.h](#).

float gyro[MFX_NUM_AXES]

Definition at line [102](#) of file [motion_fx.h](#).

float mag[MFX_NUM_AXES]

Definition at line [100](#) of file [motion_fx.h](#).

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| MFX_output_t Struct Reference | | | | | |
| MIDDLEWARES » MOTION_FX » MOTION_FX_Exported_Types | | | | | |

```
#include <motion_fx.h>
```

Data Fields

float **rotation_9X [MFX_NUM_AXES]**

float **quaternion_9X [MFX_QNUM_AXES]**

float **gravity_9X [MFX_NUM_AXES]**

float **linear_acceleration_9X [MFX_NUM_AXES]**

float **heading_9X**

float **rotation_6X [MFX_NUM_AXES]**

float **quaternion_6X [MFX_QNUM_AXES]**

float **gravity_6X [MFX_NUM_AXES]**

float **linear_acceleration_6X [MFX_NUM_AXES]**

float **heading_6X**

Detailed Description

Definition at line **105** of file [motion_fx.h](#).

Field Documentation

float gravity_6X[MFX_NUM_AXES]

Definition at line [114](#) of file **motion_fx.h**.

float gravity_9X[MFX_NUM_AXES]

Definition at line [109](#) of file **motion_fx.h**.

float heading_6X

Definition at line [116](#) of file **motion_fx.h**.

float heading_9X

Definition at line [111](#) of file **motion_fx.h**.

float linear_acceleration_6X[MFX_NUM_AXES]

Definition at line [115](#) of file **motion_fx.h**.

float linear_acceleration_9X[MFX_NUM_AXES]

Definition at line [110](#) of file **motion_fx.h**.

float quaternion_6X[MFX_QNUM_AXES]

Definition at line [113](#) of file [motion_fx.h](#).

float quaternion_9X[MFX_QNUM_AXES]

Definition at line [108](#) of file [motion_fx.h](#).

float rotation_6X[MFX_NUM_AXES]

Definition at line [112](#) of file [motion_fx.h](#).

float rotation_9X[MFX_NUM_AXES]

Definition at line [107](#) of file [motion_fx.h](#).

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

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| MFX_MagCal_input_t | | | | |
| Struct Reference | | | | |
| MIDDLEWARES » MOTION_FX » | | MOTION_FX_Exported_Types | | |

```
#include <motion_fx.h>
```

Data Fields

float **mag** [MFX_NUM_AXES]

int **time_stamp**

Detailed Description

Definition at line **127** of file [motion_fx.h](#).

Field Documentation

float mag[MFX_NUM_AXES]

Definition at line [128](#) of file **motion_fx.h**.

int time_stamp

Definition at line [129](#) of file **motion_fx.h**.

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

- [algorithms/Middlewares/ST/STM32_MotionFX_Library/Inc/motion_1.h](#)
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| MFX_MagCal_output_t Struct Reference | | | | |

#include <[motion_fx.h](#)>

Data Fields

float **hi_bias** [3]

MFX_MagCal_quality_t cal_quality

Detailed Description

Definition at line **132** of file [motion_fx.h](#).

Field Documentation

MFX_MagCal_quality_t cal_quality

Definition at line [134](#) of file **motion_fx.h**.

float hi_bias[3]

Definition at line [133](#) of file **motion_fx.h**.

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

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Functions

MOTION_FX_Exported_Functions

[MIDDLEWARES](#) » [MOTION_FX](#)

Functions

void **MotionFX_initialize** (void)
Initialize the MotionFX engine. [More...](#)

void **MotionFX_setKnobs** (**MFX_knobs_t** *knobs)
Set the internal knobs. [More...](#)

void **MotionFX_getKnobs** (**MFX_knobs_t** *knobs)
Get the current internal knobs. [More...](#)

MFX_engine_state_t **MotionFX_getStatus_6X** (void)
Get the status of the 6 axes library. [More...](#)

MFX_engine_state_t **MotionFX_getStatus_9X** (void)
Get the status of the 9 axes library. [More...](#)

void **MotionFX_enable_6X** (**MFX_engine_state_t** enable)
Enable or disable the 6 axes function (ACC + GYRO) [More...](#)

void **MotionFX_enable_9X** (**MFX_engine_state_t** enable)
Enable or disable the 9 axes function (ACC + GYRO + MAG) [More...](#)

void **MotionFX_setGbias** (float *gbias)
Set the initial gbias. [More...](#)

void **MotionFX_getGbias** (float *gbias)
Get the initial gbias. [More...](#)

void **MotionFX_update** (**MFX_output_t** *data_out,
void **MFX_input_t** *data_in, float eml_deltatime,
float *eml_q_update)

Run the Kalman filter update. More...

void **MotionFX_propagate** (**MFX_output_t**
*data_out, **MFX_input_t** *data_in, float
eml_deltatime)
Run the Kalman filter propagate. More...

void **MotionFX_MagCal_init** (int sampletime,
unsigned short int enable)
Initialize the compass calibration library.
More...

void **MotionFX_MagCal_run**
(**MFX_MagCal_input_t** *data_in)
Run magnetic calibration algorithm. More...

void **MotionFX_MagCal_getParams**
(**MFX_MagCal_output_t** *data_out)
Get magnetic calibration parameters. More...

uint8_t **MotionFX_GetLibVersion** (char *version)
Get the library version. More...

Detailed Description

Function Documentation

void MotionFX_enable_6X (MFX_engine_state_t enable)

Enable or disable the 6 axes function (ACC + GYRO)

Parameters

enable 1 to enable, 0 to disable

Return values

none

void MotionFX_enable_9X (MFX_engine_state_t enable)

Enable or disable the 9 axes function (ACC + GYRO + MAG)

Parameters

enable 1 to enable, 0 to disable

Return values

none

void MotionFX_getGbias (float * gbias)

Get the initial gbias.

Parameters

pointer to a float array containing the 3 gbias values

Return values

none

void MotionFX_getKnobs (MFX_knobs_t * knobs)

Get the current internal knobs.

Parameters

knobs knobs structure

Return values

None

uint8_t MotionFX_GetLibVersion (char * version)

Get the library version.

Parameters

version pointer to an array of 35 char

Return values

Number of characters in the version string

MFX_engine_state_t MotionFX_getStatus_6X (void)

Get the status of the 6 axes library.

Return values

1 if enabled, 0 if disabled

MFX_engine_state_t MotionFX_getStatus_9X (void)

Get the status of the 9 axes library.

Return values

1 if enabled, 0 if disabled

```
void MotionFX_initialize ( void )
```

Initialize the MotionFX engine.

Parameters

none

Return values

none

void

MotionFX_MagCal_getParams (MFX_MagCal_output_t * data_out

Get magnetic calibration parameters.

Parameters

data_out structure containing output data

Return values

none

```
void MotionFX_MagCal_init( int sampletime,  
                           unsigned short int enable  
                         )
```

Initialize the compass calibration library.

Parameters

sampletime period in milliseconds [ms] between the update function call

enable enable (1) or disable (0) library

Return values

none

void MotionFX_MagCal_run ([MFX_MagCal_input_t](#) * **data_in)**

Run magnetic calibration algorithm.

Parameters

data_in structure containing input data

Return values

none

void MotionFX_propagate ([MFX_output_t](#) * **data_out,**
 [MFX_input_t](#) * **data_in,**
 float **eml_deltatime**
 $)$

Run the Kalman filter propagate.

Parameters

data_out pointer to the [MFX_output_t](#) structure

data_in pointer to the [MFX_input_t](#) structure

eml_deltatime delta time between two propagate calls [sec]

Return values

none

void MotionFX_setGbias (float * **gbias)**

Set the initial gbias.

Parameters

gbias pointer to a float array containing the 3 gbias values

Return values

none

void MotionFX_setKnobs (MFX_knobs_t * knobs)

Set the internal knobs.

Parameters

knobs knobs structure

Return values

None

**void MotionFX_update (MFX_output_t * data_out,
 MFX_input_t * data_in,
 float eml_deltatime,
 float * eml_q_update
)**

Run the Kalman filter update.

Parameters

data_out pointer to the **MFX_output_t** structure

data_in pointer to the **MFX_input_t** structure

eml_deltatime delta time between two propagate calls [sec]

eml_q_update set to NULL

Return values

none

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Data Structures

Here are the data structures with brief descriptions:

- [!\[\]\(c8952dd80e8d24bd11a3435510c73896_img.jpg\) MFX_input_t](#)
- [!\[\]\(74ecae0d49cb649448d28ed2a44ec5a4_img.jpg\) MFX_knobs_t](#)
- [!\[\]\(b165f465ead41a556786e7b45942ddfa_img.jpg\) MFX_MagCal_input_t](#)
- [!\[\]\(9750272b93e1ecfa4e4ff8077f20fef3_img.jpg\) MFX_MagCal_output_t](#)
- [!\[\]\(ba785fc056ae1782fb52861f1cbd64e1_img.jpg\) MFX_output_t](#)

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Data Structure Index

M

M

[MFX_knobs_t](#)

[MFX_MagCal_output_t](#)

[MFX_MagCal_input_t](#)

[MFX_output_t](#)

[MFX_input_t](#)

M

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| All | Variables | | | | | | | | | | |
| a | c | f | g | h | i | m | o | q | r | s | t |

Here is a list of all struct and union fields with links to the structures/unions they belong to:

- a -

- acc : [MFX_input_t](#)
- acc_orientation : [MFX_knobs_t](#)
- ATime : [MFX_knobs_t](#)

- c -

- cal_quality : [MFX_MagCal_output_t](#)

- f -

- FrTime : [MFX_knobs_t](#)

- g -

- gbias_acc_th_sc_6X : [MFX_knobs_t](#)
- gbias_acc_th_sc_9X : [MFX_knobs_t](#)
- gbias_gyro_th_sc_6X : [MFX_knobs_t](#)
- gbias_gyro_th_sc_9X : [MFX_knobs_t](#)
- gbias_mag_th_sc_6X : [MFX_knobs_t](#)
- gbias_mag_th_sc_9X : [MFX_knobs_t](#)
- gravity_6X : [MFX_output_t](#)
- gravity_9X : [MFX_output_t](#)
- gyro : [MFX_input_t](#)
- gyro_orientation : [MFX_knobs_t](#)

- h -

- heading_6X : **MFX_output_t**
- heading_9X : **MFX_output_t**
- hi_bias : **MFX_MagCal_output_t**

- I -

- linear_acceleration_6X : **MFX_output_t**
- linear_acceleration_9X : **MFX_output_t**
- LMode : **MFX_knobs_t**

- m -

- mag : **MFX_input_t**, **MFX_MagCal_input_t**
- mag_orientation : **MFX_knobs_t**
- modx : **MFX_knobs_t**
- MTime : **MFX_knobs_t**

- o -

- output_type : **MFX_knobs_t**

- q -

- quaternion_6X : **MFX_output_t**
- quaternion_9X : **MFX_output_t**

- r -

- rotation_6X : **MFX_output_t**
- rotation_9X : **MFX_output_t**

- s -

- start_automatic_gbias_calculation : **MFX_knobs_t**

- t -

- time_stamp : **MFX_MagCal_input_t**

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| a | c | f | g | h | i | m | o | q | r | s | t |

- a -

- acc : [MFX_input_t](#)
- acc_orientation : [MFX_knobs_t](#)
- ATime : [MFX_knobs_t](#)

- c -

- cal_quality : [MFX_MagCal_output_t](#)

- f -

- FrTime : [MFX_knobs_t](#)

- g -

- gbias_acc_th_sc_6X : [MFX_knobs_t](#)
- gbias_acc_th_sc_9X : [MFX_knobs_t](#)
- gbias_gyro_th_sc_6X : [MFX_knobs_t](#)
- gbias_gyro_th_sc_9X : [MFX_knobs_t](#)
- gbias_mag_th_sc_6X : [MFX_knobs_t](#)
- gbias_mag_th_sc_9X : [MFX_knobs_t](#)
- gravity_6X : [MFX_output_t](#)
- gravity_9X : [MFX_output_t](#)
- gyro : [MFX_input_t](#)
- gyro_orientation : [MFX_knobs_t](#)

- h -

- heading_6X : **MFX_output_t**
- heading_9X : **MFX_output_t**
- hi_bias : **MFX_MagCal_output_t**

- I -

- linear_acceleration_6X : **MFX_output_t**
- linear_acceleration_9X : **MFX_output_t**
- LMode : **MFX_knobs_t**

- m -

- mag : **MFX_input_t**, **MFX_MagCal_input_t**
- mag_orientation : **MFX_knobs_t**
- modx : **MFX_knobs_t**
- MTime : **MFX_knobs_t**

- o -

- output_type : **MFX_knobs_t**

- q -

- quaternion_6X : **MFX_output_t**
- quaternion_9X : **MFX_output_t**

- r -

- rotation_6X : **MFX_output_t**
- rotation_9X : **MFX_output_t**

- s -

- start_automatic_gbias_calculation : **MFX_knobs_t**

- t -

- time_stamp : [**MFX_MagCal_input_t**](#)
-

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File List

Globals

File List

Here is a list of all files with brief descriptions:

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|  ST | |
|  STM32_MotionFX_Library | |
|  Inc | |
|  motion_fx.h | Header for motion_fx module |

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algorithms Directory Reference

Directories

directory **Middlewares**

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directory **ST**

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directory **STM32_MotionFX_Library**

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directory **Inc**

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[Inc](#)

Inc Directory Reference

Files

file [**motion_fx.h**](#) [code]

Header for motion_fx module.

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| algorithms | Middlewares | ST | STM32_MotionFX_Library |
| | | | |
| | | Data Structures Macros Enumerations Functions | |
| motion_fx.h File Reference | | | |

Header for motion_fx module. [More...](#)

#include <stdint.h>

[Go to the source code of this file.](#)

Data Structures

```
struct MFX_knobs_t
```

```
struct MFX_input_t
```

```
struct MFX_output_t
```

```
struct MFX_MagCal_input_t
```

```
struct MFX_MagCal_output_t
```

Macros

```
#define MFX_NUM_AXES 3
```

```
#define MFX_QNUM_AXES 4
```

Enumerations

```
enum MFX_engine_state_t { MFX_ENGINE_DISABLE = 0,  
                         MFX_ENGINE_ENABLE = 1 }
```

```
enum MFX_engine_output_ref_sys {  
    MFX_ENGINE_OUTPUT_NED = 0,  
    MFX_ENGINE_OUTPUT_ENU = 1 }
```

```
enum MFX_MagCal_quality_t { MFX_MAGCALUNKNOWN = 0,  
                            MFX_MAGCALPOOR, MFX_MAGCALOK,  
                            MFX_MAGCALGOOD }
```

Functions

void **MotionFX_initialize** (void)
Initialize the MotionFX engine. [More...](#)

void **MotionFX_setKnobs** (**MFX_knobs_t** *knobs)
Set the internal knobs. [More...](#)

void **MotionFX_getKnobs** (**MFX_knobs_t** *knobs)
Get the current internal knobs. [More...](#)

MFX_engine_state_t **MotionFX_getStatus_6X** (void)
Get the status of the 6 axes library. [More...](#)

MFX_engine_state_t **MotionFX_getStatus_9X** (void)
Get the status of the 9 axes library. [More...](#)

void **MotionFX_enable_6X** (**MFX_engine_state_t** enable)
Enable or disable the 6 axes function (ACC + GYRO) [More...](#)

void **MotionFX_enable_9X** (**MFX_engine_state_t** enable)
Enable or disable the 9 axes function (ACC + GYRO + MAG) [More...](#)

void **MotionFX_setGbias** (float *gbias)
Set the initial gbias. [More...](#)

void **MotionFX_getGbias** (float *gbias)
Get the initial gbias. [More...](#)

void **MotionFX_update** (**MFX_output_t** *data_out,
void **MFX_input_t** *data_in, float eml_deltatime,
float *eml_q_update)

Run the Kalman filter update. More...

void **MotionFX_propagate** (**MFX_output_t**
*data_out, **MFX_input_t** *data_in, float
eml_deltatime)
Run the Kalman filter propagate. More...

void **MotionFX_MagCal_init** (int sampletime,
unsigned short int enable)
Initialize the compass calibration library.
More...

void **MotionFX_MagCal_run**
(**MFX_MagCal_input_t** *data_in)
Run magnetic calibration algorithm. More...

void **MotionFX_MagCal_getParams**
(**MFX_MagCal_output_t** *data_out)
Get magnetic calibration parameters. More...

uint8_t **MotionFX_GetLibVersion** (char *version)
Get the library version. More...

Detailed Description

Header for motion_fx module.

Author

MEMS Application Team

Version

V2.0.0

Date

01-May-2017

Attention

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Definition in file [motion_fx.h](#).

MotionFX Software Library

MotionFX Software Library Documentation

| Main Page | Modules | Data Structures | Files | |
|-----------|-----------|-----------------|------------|--------|
| File List | Globals | | | |
| All | Functions | Enumerations | Enumerator | Macros |

Here is a list of all functions, variables, defines, enums, and typedefs with links to the files they belong to:

- MFX_ENGINE_DISABLE : [motion_fx.h](#)
- MFX_ENGINE_ENABLE : [motion_fx.h](#)
- MFX_ENGINE_OUTPUT_ENU : [motion_fx.h](#)
- MFX_ENGINE_OUTPUT_NED : [motion_fx.h](#)
- MFX_engine_output_ref_sys : [motion_fx.h](#)
- MFX_engine_state_t : [motion_fx.h](#)
- MFX_MagCal_quality_t : [motion_fx.h](#)
- MFX_MAGCALGOOD : [motion_fx.h](#)
- MFX_MAGCALOK : [motion_fx.h](#)
- MFX_MAGCALPOOR : [motion_fx.h](#)
- MFX_MAGCALUNKNOWN : [motion_fx.h](#)
- MFX_NUM_AXES : [motion_fx.h](#)
- MFX_QNUM_AXES : [motion_fx.h](#)
- MotionFX_enable_6X() : [motion_fx.h](#)
- MotionFX_enable_9X() : [motion_fx.h](#)
- MotionFX_getGbias() : [motion_fx.h](#)
- MotionFX_getKnobs() : [motion_fx.h](#)
- MotionFX_GetLibVersion() : [motion_fx.h](#)
- MotionFX_getStatus_6X() : [motion_fx.h](#)
- MotionFX_getStatus_9X() : [motion_fx.h](#)
- MotionFX_initialize() : [motion_fx.h](#)
- MotionFX_MagCal_getParams() : [motion_fx.h](#)
- MotionFX_MagCal_init() : [motion_fx.h](#)
- MotionFX_MagCal_run() : [motion_fx.h](#)
- MotionFX_propagate() : [motion_fx.h](#)
- MotionFX_setGbias() : [motion_fx.h](#)
- MotionFX_setKnobs() : [motion_fx.h](#)
- MotionFX_update() : [motion_fx.h](#)

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MotionFX Software Library

MotionFX Software Library Documentation

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| File List | Globals | | | |
| All | Functions | Enumerations | Enumerator | Macros |

- MotionFX_enable_6X() : [motion_fx.h](#)
- MotionFX_enable_9X() : [motion_fx.h](#)
- MotionFX_getGbias() : [motion_fx.h](#)
- MotionFX_getKnobs() : [motion_fx.h](#)
- MotionFX_GetLibVersion() : [motion_fx.h](#)
- MotionFX_getStatus_6X() : [motion_fx.h](#)
- MotionFX_getStatus_9X() : [motion_fx.h](#)
- MotionFX_initialize() : [motion_fx.h](#)
- MotionFX_MagCal_getParams() : [motion_fx.h](#)
- MotionFX_MagCal_init() : [motion_fx.h](#)
- MotionFX_MagCal_run() : [motion_fx.h](#)
- MotionFX_propagate() : [motion_fx.h](#)
- MotionFX_setGbias() : [motion_fx.h](#)
- MotionFX_setKnobs() : [motion_fx.h](#)
- MotionFX_update() : [motion_fx.h](#)

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MotionFX Software Library

MotionFX Software Library Documentation

| Main Page | Modules | Data Structures | Files | |
|-----------|-----------|-----------------|------------|--------|
| File List | Globals | | | |
| All | Functions | Enumerations | Enumerator | Macros |

- MFX_engine_output_ref_sys : [motion_fx.h](#)
- MFX_engine_state_t : [motion_fx.h](#)
- MFX_MagCal_quality_t : [motion_fx.h](#)

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MotionFX Software Library

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| Main Page | Modules | Data Structures | Files | |
|-----------|-----------|-----------------|------------|--------|
| File List | Globals | | | |
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- MFX_ENGINE_DISABLE : [motion_fx.h](#)
- MFX_ENGINE_ENABLE : [motion_fx.h](#)
- MFX_ENGINE_OUTPUT_ENU : [motion_fx.h](#)
- MFX_ENGINE_OUTPUT_NED : [motion_fx.h](#)
- MFX_MAGCALGOOD : [motion_fx.h](#)
- MFX_MAGCALOK : [motion_fx.h](#)
- MFX_MAGCALPOOR : [motion_fx.h](#)
- MFX_MAGCALUNKNOWN : [motion_fx.h](#)

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MotionFX Software Library

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|-----------|-----------|-----------------|------------|--------|
| File List | Globals | | | |
| All | Functions | Enumerations | Enumerator | Macros |

- MFX_NUM_AXES : [motion_fx.h](#)
- MFX_QNUM_AXES : [motion_fx.h](#)

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MotionFX Software Library

MotionFX Software Library Documentation

| Main Page | Modules | Data Structures | Files |
|------------|-------------|-----------------|------------------------|
| File List | Globals | | |
| algorithms | Middlewares | ST | STM32_MotionFX_Library |

motion_fx.h

Go to the documentation of this file.

```
1
38 /* Define to prevent recursive inclusion ---
   *-----*/
39 #ifndef _MOTION_FX_H_
40 #define _MOTION_FX_H_
41
42 #ifdef __cplusplus
43 extern "C" {
44 #endif
45
46 /* Includes -
   *-----*/
47 #include <stdint.h>
48
61 /* Exported constants -
   *-----*/
62 #define MFX_NUM_AXES      3
63 #define MFX_QNUM_AXES     4
64
65 /* Exported types -
   *-----*/
66 typedef enum
67 {
68     MFX_ENGINE_DISABLE = 0,
69     MFX_ENGINE_ENABLE  = 1
```

```
70 } MFX_engine_state_t;
71
72 typedef enum
73 {
74     MFX_ENGINE_OUTPUT_NED = 0,
75     MFX_ENGINE_OUTPUT_ENU = 1
76 } MFX_engine_output_ref_sys;
77
78 typedef struct
79 {
80     float ATime;
81     /* merge rate to the accel */
82     float MTime;
83     /* merge rate to the mag */
84     float FrTime;
85     /* merge rate to the accel when external
accelerations occurs */
86     unsigned char LMode;
87     /* gyro bias learn mode: 1-static learning, 2-
dynamic learning */
88     float gbias_mag_th_sc_6X;
89     /* 6 axes scaler for the gyro bias mag
threshold nominal */
90     float gbias_acc_th_sc_6X;
91     /* 6 axes scaler for the gyro bias acc
threshold nominal */
92     float gbias_gyro_th_sc_6X;
93     /* 6 axes scaler for the gyro bias gyro
threshold nominal */
94     float gbias_mag_th_sc_9X;
95     /* 9 axes scaler for the gyro bias mag
threshold nominal */
96     float gbias_acc_th_sc_9X;
97     /* 9 axes scaler for the gyro bias acc
threshold nominal */
98     float gbias_gyro_th_sc_9X;
99     /* 9 axes scaler for the gyro bias gyro
```

```
    threshold nominal */
90 |     unsigned char modx;
/* setting to indicate the decimation, set to
1 in smartphone/tablet, set to >=1 in embedded
solutions */
91 |     char acc_orientation[MFX_QNUM_AXES];
/* accelerometer data orientation */
92 |     char gyro_orientation[MFX_QNUM_AXES];
/* gyroscope data orientation */
93 |     char mag_orientation[MFX_QNUM_AXES];
/* magnetometer data orientation */
94 |     MFX_engine_output_ref_sys output_type;
/* 0: NED, 1: ENU */
95 |     int start_automatic_gbias_calculation;
96 } MFX_knobs_t;
97
98 typedef struct
99 {
100 |     float mag[MFX_NUM_AXES];
/* Calibrated mag [uT]/50 */
101 |     float acc[MFX_NUM_AXES];
/* Acceleration in [g] */
102 |     float gyro[MFX_NUM_AXES];
/* Angular rate [dps] */
103 } MFX_input_t;
104
105 typedef struct
106 {
107 |     float rotation_9X[MFX_NUM_AXES];
/* 9 axes yaw, pitch and roll */
108 |     float quaternion_9X[MFX_QNUM_AXES];
/* 9 axes quaternion */
109 |     float gravity_9X[MFX_NUM_AXES];
/* 9 axes device frame gravity */
110 |     float
```

```
111     float heading_9X;                      /* 9 axes
   heading */
112     float rotation_6X[MFX_NUM_AXES];
   /* 6 axes yaw, pitch and roll */
113     float quaternion_6X[MFX_QNUM_AXES];
   /* 6 axes quaternion */
114     float gravity_6X[MFX_NUM_AXES];
   /* 6 axes device frame gravity */
115     float
   linear_acceleration_6X[MFX_NUM_AXES];    /* 6
   axes device frame linear acceleration */
116     float heading_6X;                      /* 6 axes
   heading */
117 } MFX_output_t;
118
119 typedef enum
120 {
121     MFX_MAGCALUNKNOWN = 0,
122     MFX_MAGCALPOOR,
123     MFX_MAGCALOK,
124     MFX_MAGCALGOOD
125 } MFX_MagCal_quality_t;
126
127 typedef struct {
128     float mag[MFX_NUM_AXES];
   /* Uncalibrated mag [uT]/50 */
129     int time_stamp;
   /* Timestamp [ms] */
130 } MFX_MagCal_input_t;
131
132 typedef struct {
133     float hi_bias[3];
   /* Hard iron offset array [uT]/50 */
134     MFX_MagCal_quality_t cal_quality;
   /* Calibration quality factor */
135 } MFX_MagCal_output_t;
136
```

```
141 /* Exported variables -----
142   * Exported macro -----
143
148 /* Exported functions -----
149
155 void MotionFX_initialize(void);
156
162 void MotionFX_setKnobs(MFX_knobs_t *knobs);
163
169 void MotionFX_getKnobs(MFX_knobs_t *knobs);
170
175 MFX_engine_state_t
    MotionFX_getStatus_6X(void);
176
181 MFX_engine_state_t
    MotionFX_getStatus_9X(void);
182
188 void MotionFX_enable_6X(MFX_engine_state_t
    enable);
189
195 void MotionFX_enable_9X(MFX_engine_state_t
    enable);
196
202 void MotionFX_setGbias(float *gbias);
203
209 void MotionFX_getGbias(float *gbias);
210
219 void MotionFX_update(MFX_output_t *data_out,
    MFX_input_t *data_in, float eml_deltatime,
    float *eml_q_update);
220
228 void MotionFX_propagate(MFX_output_t
    *data_out, MFX_input_t *data_in, float
    eml_deltatime);
```

```
229
236 void MotionFX_MagCal_init(int sampletime,
     unsigned short int enable);
237
243 void MotionFX_MagCal_run(MFX_MagCal_input_t
     *data_in);
244
250 void
     MotionFX_MagCal_getParams(MFX_MagCal_output_t
     *data_out);
251
257 uint8_t MotionFX_GetLibVersion(char
     *version);
258
271 #ifdef __cplusplus
272 }
273 #endif
274
275 #endif /* _MOTION_FX_H_ */
276
277 /***** (C) COPYRIGHT
     STMicroelectronics *****END OF FILE****/
```