mthread

0.5.1

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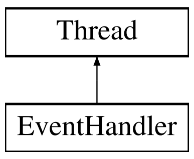
Class Documentation

4.1 EventHandler Class Reference

A Thread that only executes when a given event occurs.

`#include <mthread.h>`

Inheritance diagram for EventHandler:



Public Member Functions

- EventHandler ()

  Constructor.
- virtual ∼EventHandler ()

  Destructor.

Protected Member Functions

- virtual bool condition ()

  Condition to be evaluated on each call to determine whether or not to run the event. The condition will not be checked again until the on_event() function returns false.
- bool loop ()

  Main loop.
- virtual bool on_event ()

  Called when the even occurs.

Private Attributes

- bool trigger

  Becomes true when the event occurs; returns to false when the event has been handled.

4.1.1 Detailed Description

A Thread that only executes when a given event occurs.

4.1.2 Member Function Documentation

4.1.2.1 bool EventHandler::condition ( ) [protected, virtual]

Condition to be evaluated on each call to determine whether or not to run the event. The condition will not be checked again until the on_event() function returns false.

Returns

true if the event has occurred; false if it has not.

4.1.2.2 bool EventHandler::loop (void) [protected, virtual]

Main loop.

See also

Thread::loop().

Reimplemented from Thread.

4.1.2.3 bool EventHandler::on_event ( ) [protected, virtual]

Called when the even occurs.

Returns

true if the event hasn't been completely handled, false to wait for the next event.

Note

This function does not necessarily have to check the kill_flag value as it will be honoured by the loop() function when the trigger value is false.

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

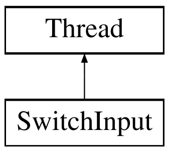
- mthread.h
- mthread.cpp

4.2 SwitchInput Class Reference

Handler for a switch input.

`#include <mthread.h>`

Inheritance diagram for SwitchInput:



Public Types

- enum Type { pull_up_internal, pull_up, pull_down }

  Types of switches.

Public Member Functions

- SwitchInput (int pin, unsigned long debounce=DEFAULT_DEBOUNCE, Type type=pull_up_internal)

  Constructor.
- virtual ∼SwitchInput ()

  Destructor.
- bool is_closed () const

  Checks to see if the switch is closed.
- bool is_open () const

  Checks to see if the switch is open.
- virtual void on_close ()

  Called once when the switch closes.
- virtual void on_open ()

  Called once when the switch opens.
- unsigned long time_closed () const

  Checks the length of time the switch has been closed.
- unsigned long time_open () const

  Checks the length of time the switch has been open.

Protected Member Functions

- bool loop ()

  Main loop.

Private Attributes

- unsigned long debounce

  The debounce time (in milliseconds).
- unsigned long last_change

  The time of the last change (in millisecnods, ignoring debounce).
- unsigned long last_debounce

  The time of the last change (in milliseconds, after debounce filtering).
- int current_value

  The switch's current value (after debounce filtering).
- int last_value

  The switch's value on the last read (ignoring debounce).
- int pin

  The pin the switch is connected to.
- Type type

  The type of switch connected.

4.2.1 Detailed Description

Handler for a switch input.

4.2.2 Member Enumeration Documentation

4.2.2.1 enum **SwitchInput::Type**

Types of switches.

Enumerator:

pull_up_internal	Switch uses the internal pull-up resistor.
pull_up	Switch uses an external pull-up resistor.
pull_down	Switch uses an external pull-down resistor.

4.2.3 Constructor & Destructor Documentation

4.2.3.1 **SwitchInput::SwitchInput (** int *pin,* unsigned long *debounce* = **DEFAULT_DEBOUNCE***,* **Type** *type* = **pull_up_internal)**

Constructor.

Parameters

pin	The pin number the switch is connected to.
debounce	The debounce time (in milliseconds).
type	The type of switch connected.

4.2.4 Member Function Documentation

4.2.4.1 bool **SwitchInput::is_closed** ( ) const

Checks to see if the switch is closed.

Returns

true if the switch is closed, false if it's open.

4.2.4.2 bool **SwitchInput::is_open** ( ) const

Checks to see if the switch is open.

Returns

true if the switch is open, false if it's closed.

4.2.4.3 bool **SwitchInput::loop** (void) `[protected, virtual]`

Main loop.

See also

Thread::loop().

Reimplemented from Thread.

4.2.4.4 unsigned long **SwitchInput::time_closed** ( ) const

Checks the length of time the switch has been closed.

Returns

The amount of time (in milliseconds) the switch has been closed, or 0 if the switch is open.

4.2.4.5 unsigned long **SwitchInput::time_open** ( ) const

Checks the length of time the switch has been open.

Returns

The amount of time (in milliseconds) the switch has been open, or 0 if the switch is closed.

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

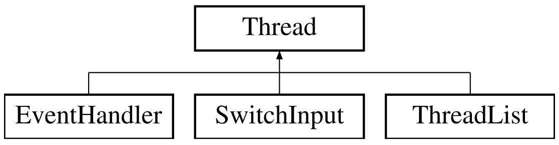
- mthread.h
- mthread.cpp

4.3 Thread Class Reference

Provides thread functionality.

`#include <mthread.h>`

Inheritance diagram for Thread:



Public Types

- enum Mode { run_mode, pause_mode, sleep_mode, sleep_milli_mode, sleep_-micro_mode, kill_mode }

  Various running modes for a Thread.

Public Member Functions

- Thread ()

  Constructor.
- virtual ∼Thread ()

  Destructor.
- Mode get_mode () const

  Returns the running mode for the Thread.
- bool kill (bool force=false)

  Kills a Thread.
- bool pause ()

  Pauses a Thread. This function will cause a Thread to pause until its resume() function is called. This function will cancel any sleep timer currently in effect.
- bool resume ()

  Resumes a paused or sleeping Thread.
- bool sleep (unsigned long t)

  Puts the Thread to sleep for a certain number of seconds. If already running, the thread's loop() function will be allowed to finish, but will not be called again until the timeout has expired, or the resume() or kill() function has been called.
- bool sleep_micro (unsigned long t)

  Puts the Thread to sleep for a certain number of microseconds. If already running, the thread's loop() function will be allowed to finish, but will not be called again until the timeout has expired, or the resume() or kill() function has been called.
- bool sleep_milli (unsigned long t)

  Puts the Thread to sleep for a certain number of milliseconds. If already running, the thread's loop() function will be allowed to finish, but will not be called again until the timeout has expired, or the resume() or kill() function has been called.

Protected Member Functions

- virtual bool loop ()

  The Thread's main loop. This function is to be overridden. It takes the place of the loop function found in most Arduino programs. A single loop() should run as quickly as possible, as it will hold up other Thread objects while it is executing.

Protected Attributes

- bool kill_flag

  Kill flag. This variable should be checked at the beginning of every loop() function. If it is true, the Thread has been requested to be killed, and the loop() function should behave accordingly. The request can be denied by resetting it to false.

Private Member Functions

- bool call ()

  Determines if the function is active and runs through a loop if appropriate. This function is called automatically by a ThreadList.

Private Attributes

- unsigned long stop_time

  The time the thread was stopped at.
- unsigned long wait_time

  The amount of the the thread is to wait for.
- Mode mode

  The thread's running mode (can be read through the get_mode() function).

Friends

- class **ThreadList**
- void **loop** (void)

4.3.1 Detailed Description

Provides thread functionality.

4.3.2 Member Enumeration Documentation

4.3.2.1 enum Thread::Mode

Various running modes for a Thread.

Enumerator:

run_mode	Thread is running.
pause_mode	Thread is paused.
sleep_mode	Thread is sleeping (for seconds).
sleep_milli_mode	Thread is sleeping (for milliseconds).
sleep_micro_mode	Thread is sleeping (for microseconds).
kill_mode	Thread is to be killed on next call.

4.3.3 Member Function Documentation

4.3.3.1 bool Thread::call ( ) `[private]`

Determines if the function is active and runs through a loop if appropriate. This function is called automatically by a ThreadList.

Returns

true if the Thread needs to be called again, false if the Thread has completed execution.

Note

It is important to note that once a Thread has completed its execution it will automatically destroy itself and MUST NOT be used again. A new instance must first be created.

4.3.3.2 Thread::Mode Thread::get_mode ( ) const

Returns the running mode for the Thread.

Returns

The running mode.

4.3.3.3 bool Thread::kill (bool *force* = `false`)

Kills a Thread.

Parameters

force	If true, the Thread will be killed immediately on the next call without running any more loops, if false, the Thread will have to opportunity to terminate cleanly but will be resumed if sleeping or paused.

Note

If the force parameter is set to false, the Thread could possibly ignore or cancel the request, however this is still the preferred way of calling the kill() function.

Returns

true on success, false on failure.

4.3.3.4 bool Thread::loop (void) `[protected, virtual]`

The Thread's main loop. This function is to be overridden. It takes the place of the loop function found in most Arduino programs. A single loop() should run as quickly as possible, as it will hold up other Thread objects while it is executing.

Note

At the beginning of each loop, the function should check the kill_flag.

Returns

true if the loop needs to be called again, false if the Thread has completed executing (at which point it will be destroyed).

Reimplemented in SwitchInput, EventHandler, and ThreadList.

4.3.3.5 bool Thread::pause ( )

Pauses a Thread. This function will cause a Thread to pause until its resume() function is called. This function will cancel any sleep timer currently in effect.

Returns

true on success, false on failure.

4.3.3.6 bool Thread::resume ( )

Resumes a paused or sleeping Thread.

Returns

true on success, false on failure.

4.3.3.7 bool Thread::sleep (unsigned long *t*)

Puts the Thread to sleep for a certain number of seconds. If already running, the thread's loop() function will be allowed to finish, but will not be called again until the timeout has expired, or the resume() or kill() function has been called.

Parameters

t	The number of seconds the Thread is to sleep for.

Returns

true on success, false on failure.

4.3.3.8 bool Thread::sleep_micro (unsigned long *t*)

Puts the Thread to sleep for a certain number of microseconds. If already running, the thread's loop() function will be allowed to finish, but will not be called again until the timeout has expired, or the resume() or kill() function has been called.

Parameters

t	The number of microseconds the Thread is to sleep for

Returns

true on success, false on failure.

4.3.3.9 bool Thread::sleep_milli (unsigned long *t*)

Puts the Thread to sleep for a certain number of milliseconds. If already running, the thread's loop() function will be allowed to finish, but will not be called again until the timeout has expired, or the resume() or kill() function has been called.

Parameters

t	The number of milliseconds the Thread is to sleep for.

Returns

true on success, false on failure.

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

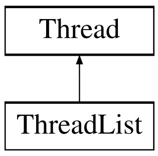
- mthread.h
- mthread.cpp

4.4 ThreadList Class Reference

An object for running several Thread objects simultaneously. A ThreadList object is a Thread in and of itself. This allows the creation of tiered ThreadList objects by placing a lower-priority ThreadList inside of a higher-priority ThreadList.

```
#include <mthread.h>
```

Inheritance diagram for ThreadList:



Public Member Functions

- ThreadList (bool keep=false)

  Constructor.
- ~ThreadList ()

  Destructor.
- bool add_thread (Thread ∗t)

  Adds a Thread to the ThreadList.

Protected Member Functions

- bool loop ()

  The main loop.

Private Attributes

- Thread ∗∗ thread

  An array of pointers to the Thread objects in the list.
- unsigned thread_count

  The number of Thread objects in the list.
- unsigned thread_index

  The index number of the active thread.
- bool keep_flag

  If true, the ThreadList will not destroy itself when it becomes empty.

4.4.1 Detailed Description

An object for running several Thread objects simultaneously. A ThreadList object is a Thread in and of itself. This allows the creation of tiered ThreadList objects by placing a lower-priority ThreadList inside of a higher-priority ThreadList.

Note

DO NOT place a Thread in more than one ThreadList or more than once in a single ThreadList. DO NOT place a ThreadList inside of itself or one of its children. Also, DO NOT place the main_thread_list in another ThreadList. These WILL cause memory corruption (and are silly things to do in the first place).

4.4.2 Constructor & Destructor Documentation

4.4.2.1 ThreadList::ThreadList (bool *keep* = `false`)

Constructor.

Parameters

keep	If true, the ThreadList will continue to run even after it's empty, otherwise it will automatically destroy itself once all of its Thread objects have finished.

4.4.3 Member Function Documentation

4.4.3.1 bool ThreadList::add_thread (Thread $*$ *t*)

Adds a Thread to the ThreadList.

Parameters

t	A pointer to the Thread to be added.

Returns

true on success, false on failure.

4.4.3.2 bool ThreadList::loop (void) `[protected, virtual]`

The main loop.

See also

Thread::loop().

Reimplemented from Thread.

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

- mthread.h
- mthread.cpp

Chapter 5

File Documentation

5.1 mthread.cpp File Reference

```
#include "mthread.h"
```

Functions

- void **loop** ()

Variables

- ThreadList ∗ main_thread_list = new ThreadList

  A pointer to the main ThreadList. This object will be run in place of the loop function expected in most Arduino programs.

5.1.1 Detailed Description

Author

Jonathan Lamothe

5.2 mthread.h File Reference

```
#include "../newdel/newdel.h"
```

Classes

- class Thread

  Provides thread functionality.

- class ThreadList

  An object for running several Thread objects simultaneously. A ThreadList object is a Thread in and of itself. This allows the creation of tiered ThreadList objects by placing a lower-priority ThreadList inside of a higher-priority ThreadList.
- class EventHandler

  A Thread that only executes when a given event occurs.
- class SwitchInput

  Handler for a switch input.

Defines

- #define DEFAULT_DEBOUNCE 50

  Default switch debounce time.

Functions

- void **loop** (void)

Variables

- ThreadList $*$ main_thread_list

  A pointer to the main ThreadList. This object will be run in place of the loop function expected in most Arduino programs.

5.2.1 Detailed Description

Author

Jonathan Lamothe