Erriez TM1638 library for Arduino

1.2.0

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Contents

Chapter 1

Timestamp measuring library for Arduino

This is a timestamp library for Arduino that can be used to measure execution time in microseconds or milliseconds.

Hardware

Any Arduino / ESP8266 board.

Library documentation

- Doxygen online HTML
- Doxygen PDF

Examples

Arduino IDE | Examples | Erriez Timestamp:

- ErriezMicroseconds
- ErriezMilliseconds

Example output Timestamp | Microseconds

```
Timestamp with microseconds resolution example

Printing this message takes: 768us
And this message takes: 2044us
delayMicroseconds(15) duration: 20us
analogRead() duration: 212us
digitalRead() duration: 4us
```

Example output Timestamp | Milliseconds

```
Timestamp with milliseconds resolution example

delay(15) takes:
15ms
14ms
16ms
15ms
15ms
16ms
14ms
15ms
16ms
15ms
```

Usage

Initialization

Add include file:

```
{c++}
#include <ErriezTimestamp.h>
```

Create timestamp object with microseconds resolution:

```
{c++}
TimestampMicros timestamp;
```

Create timestamp object with milliseconds resolution:

```
{c++}
TimestampMillis timestamp;
```

Single measurement

```
{c++}
unsigned long duration;

// Start measurement
timestamp.start();
// Do something
duration = timestamp.delta();

// Start new measurement
timestamp.start();
// Do something
duration = timestamp.delta();
```

Multiple measurements

```
{c++}
// Start timestamp
timestamp.start();
// Do something and print timstamp
timestamp.print();

// Do something and print timestamp without calling start()
timestamp.print();
```

Constraints

TimestampMicros uses the function `micros()`. TimestampMillis uses the function `millis()`.

Please refer to the description of these functions for the maximum possible duration and minimum resolution:

- https://www.arduino.cc/reference/en/language/functions/time/micros/
- https://www.arduino.cc/reference/en/language/functions/time/millis/

The timestamp functions introduce a small calling overhead on low-end microcontrollers. For example calling `start()` and `delta()` on an Arduino UNO may take an additional 4 to 8 microseconds. This is overhead is negligible on targets with a higher CPU clock such as the ESP8266.

Library installation

Please refer to the Wiki page.

Other Arduino Libraries and Sketches from Erriez

- Erriez Libraries and Sketches

Chapter 2

Hierarchical Index

2.1 Class Hierarchy

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

Chapter 3

Class Index

3.1 Class List

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

Chapter 4

File Index

4.1 File List

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

Chapter 5

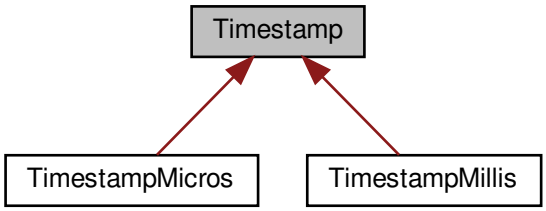
Class Documentation

5.1 Timestamp Class Reference

Timstamp class.

`#include <ErriezTimestamp.h>`

Inheritance diagram for Timestamp:



Public Member Functions

- Timestamp ()

  Timestamp constructor.
- virtual void start ()=0

  Derived class must implement start()
- virtual unsigned long delta ()=0

  Derived class must implement delta()
- virtual void print ()=0

  Derived class must implement print()

Public Attributes

- unsigned long timestampStart

  Timestamp at the beginning of a measurement.

5.1.1 Detailed Description

Timstamp class.

Definition at line 42 of file ErriezTimestamp.h.

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

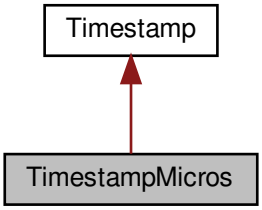
- src/ErriezTimestamp.h
- src/ErriezTimestamp.cpp

5.2 TimestampMicros Class Reference

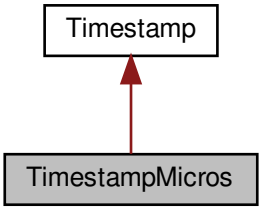
TimestampMicros class derived from Timestamp.

`#include <ErriezTimestamp.h>`

Inheritance diagram for TimestampMicros:



Collaboration diagram for TimestampMicros:



Public Member Functions

- void start () override
  Start measurement in microseconds.
- unsigned long delta () override
  End measurement.
- void print () override
  Print measurement in microseconds.

5.2.1 Detailed Description

TimestampMicros class derived from Timestamp.

Definition at line 57 of file ErriezTimestamp.h.

5.2.2 Member Function Documentation

5.2.2.1 delta()

```
unsigned long TimestampMicros::delta ( )  [override], [virtual]
```

End measurement.

Returns

Duration in micro seconds

Implements Timestamp.

Definition at line 58 of file ErriezTimestamp.cpp.

5.2.2.2 print()

```
void TimestampMicros::print ( )  [override], [virtual]
```

Print measurement in microseconds.

Print millis() - start time and restart measurement

Returns

Duration in microseconds

Implements Timestamp.

Definition at line 70 of file ErriezTimestamp.cpp.

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

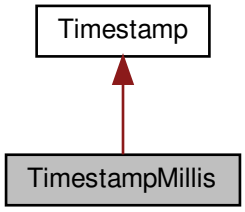
- src/ErriezTimestamp.h
- src/ErriezTimestamp.cpp

5.3 TimestampMillis Class Reference

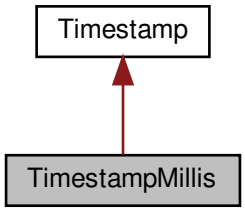
TimestampMillis class derived from Timestamp.

`#include <ErriezTimestamp.h>`

Inheritance diagram for TimestampMillis:



Collaboration diagram for TimestampMillis:



Public Member Functions

- void start () override

  Start measurement in milliseconds.
- unsigned long delta () override

  End measurement.
- void print () override

  Print measurement in milliseconds.

5.3.1 Detailed Description

TimestampMillis class derived from Timestamp.

Definition at line 68 of file ErriezTimestamp.h.

5.3.2 Member Function Documentation

5.3.2.1 delta()

```
unsigned long TimestampMillis::delta ( )  [override], [virtual]
```

End measurement.

Returns

Duration in milliseconds

Implements Timestamp.

Definition at line 94 of file ErriezTimestamp.cpp.

5.3.2.2 print()

```
void TimestampMillis::print ( )  [override], [virtual]
```

Print measurement in milliseconds.

Print millis() - start time and restart measurement

Returns

Duration in milliseconds

Implements Timestamp.

Definition at line 106 of file ErriezTimestamp.cpp.

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

- src/ErriezTimestamp.h
- src/ErriezTimestamp.cpp

Chapter 6

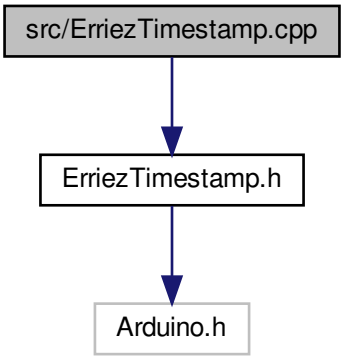
File Documentation

6.1 src/ErriezTimestamp.cpp File Reference

Timestamp library for Arduino.

```
#include "ErriezTimestamp.h"
```

Include dependency graph for ErriezTimestamp.cpp:



6.1.1 Detailed Description

Timestamp library for Arduino.

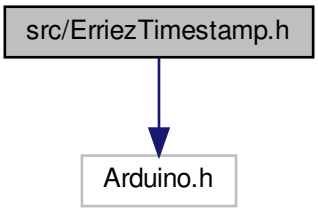
Source: https://github.com/Erriez/ErriezTimestamp Documentation: https://erriez.↩
github.io/ErriezTimestamp

6.2 src/ErriezTimestamp.h File Reference

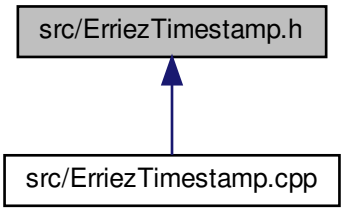
Timestamp library for Arduino.

```
#include <Arduino.h>
```

Include dependency graph for ErriezTimestamp.h:



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



Classes

- class Timestamp

  Timstamp class.
- class TimestampMicros

  TimestampMicros class derived from Timestamp.
- class TimestampMillis

  TimestampMillis class derived from Timestamp.

6.2.1 Detailed Description

Timestamp library for Arduino.

Source: https://github.com/Erriez/ErriezTimestamp Documentation: https://erriez.↩github.io/ErriezTimestamp

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