Jimmy Challenge

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Contents

1 Hierarchical Index 2

1.1 Class Hierarchy 2

2 Class Index 2

2.1 Class List 2

3 Class Documentation 3

3.1 interface::Audio Class Reference 3

3.1.1 Detailed Description 4

3.2 Button Class Reference 4

3.2.1 Detailed Description 4

3.2.2 Member Function Documentation 4

3.3 ButtonTask Class Reference 5

3.3.1 Detailed Description 5

3.4 Buzzer Class Reference 5

3.4.1 Detailed Description 6

3.4.2 Member Function Documentation 6

3.5 BuzzerTask Class Reference 6

3.5.1 Detailed Description 7

3.6 Context Class Reference 7

3.6.1 Detailed Description 8

3.6.2 Constructor & Destructor Documentation 8

3.6.3 Member Function Documentation 9

3.7 interface::Input Class Reference 10

3.7.1 Detailed Description 10

3.8 Led Class Reference 11

3.8.1 Detailed Description 11

3.9 LedPwm Class Reference 11

3.9.1 Detailed Description 12

3.10 LedPwmTask Class Reference 12

3.10.1 Detailed Description . . . 13

3.11 LedRgb Class Reference . . . 13

3.11.1 Detailed Description . . . 13

3.12 LedRgbTask Class Reference . . . 14

3.12.1 Detailed Description . . . 14

3.13 LedTask Class Reference . . . 14

3.13.1 Detailed Description . . . 15

3.14 interface::Light Class Reference . . . 15

3.14.1 Detailed Description . . . 16

3.15 interface::LightPwm Class Reference . . . 16

3.15.1 Detailed Description . . . 16

3.16 MessageService Class Reference . . . 16

3.16.1 Detailed Description . . . 17

3.16.2 Member Function Documentation . . . 17

3.17 Multiplexer Class Reference . . . 18

3.17.1 Detailed Description . . . 18

3.17.2 Member Function Documentation . . . 18

3.18 Scheduler Class Reference . . . 19

3.18.1 Detailed Description . . . 19

3.19 Sonar Class Reference . . . 19

3.19.1 Detailed Description . . . 20

3.19.2 Member Function Documentation . . . 20

3.20 SonarTask Class Reference . . . 20

3.20.1 Detailed Description . . . 21

3.21 Task Class Reference . . . 21

3.21.1 Detailed Description . . . 22

3.21.2 Member Function Documentation . . . 22

3.22 Timer Class Reference . . . 22

3.22.1 Detailed Description . . . 22

1 Hierarchical Index

1.1 Class Hierarchy

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

- **interface::Audio** ??
  - **Buzzer** ??
- **Context** ??
- **interface::Input** ??
  - **Button** ??
  - **Sonar** ??
- **LedRgb** ??
- **interface::Light** ??
  - **interface::LightPwm** ??
    - **LedPwm** ??
  - **Led** ??
    - **LedPwm** ??
- **MessageService** ??
- **Multiplexer** ??
- **Scheduler** ??
- **Task** ??
  - **ButtonTask** ??
  - **BuzzerTask** ??
  - **LedPwmTask** ??
  - **LedRgbTask** ??
  - **LedTask** ??
  - **SonarTask** ??
- **Timer** ??

2 Data Structure Index

2.1 Data Structures

Here are the data structures with brief descriptions:

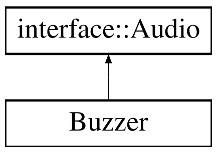
interface::Audio ??
Button ??
ButtonTask ??
Buzzer ??
BuzzerTask ??
Context ??
interface::Input ??
Led ??
LedPwm ??
LedPwmTask ??
LedRgb ??
LedRgbTask ??
LedTask ??
interface::Light ??
interface::LightPwm ??
MessageService ??
Multiplexer ??
Scheduler ??
Sonar ??
SonarTask ??
Task ??
Timer ??

3 Data Structure Documentation

3.1 interface::Audio Class Reference

```
#include <Audio.h>
```

Inheritance diagram for interface::Audio:



Public Member Functions

- virtual void **playSound** (int)=0

3.1.1 Detailed Description

Interface for audio devices

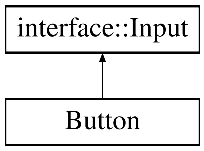
The documentation for this class was generated from the following file:

- src/interface/Audio.h

3.2 Button Class Reference

`#include <Button.h>`

Inheritance diagram for Button:



Public Member Functions

- Button (int, unsigned long)

  Initialize the button and set init config
- bool readBool ()

  Read a state from the hardware button

Protected Attributes

- int **pin**

3.2.1 Detailed Description

Class to manage signals from a button

3.2.2 Member Function Documentation

3.2.2.1 bool Button::readBool ( ) `[virtual]`

Read a state from the hardware button

When the button is pressed read the state and avoid debouncing

Reimplemented from interface::Input.

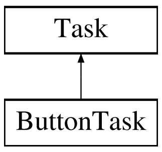
The documentation for this class was generated from the following files:

- src/input/Button.h
- src/input/Button.cpp

3.3 ButtonTask Class Reference

`#include <ButtonTask.h>`

Inheritance diagram for ButtonTask:



Public Member Functions

- ButtonTask (int, unsigned long, Context ∗)

  Init pin, debounce time and context
- void init (int, void(∗)())

  Set the period time for the task execution and the behaviour
- void tick ()

  The function to execute when the scheduler gives the resources to the task

Data Fields

- Button ∗ **btn**

Protected Attributes

- int **pin**
- unsigned long **debounceDelay**

Additional Inherited Members

3.3.1 Detailed Description

Class to create a task using the state of a button

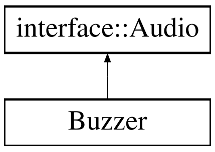
The documentation for this class was generated from the following files:

- src/task/ButtonTask.h
- src/task/ButtonTask.cpp

3.4 Buzzer Class Reference

`#include <Buzzer.h>`

Inheritance diagram for Buzzer:



Public Member Functions

- Buzzer (const int)

  Set the buzzer
- void playSound (int)

  Play a sound

Protected Attributes

- int **pin**

3.4.1 Detailed Description

Class to manage the buzzer sounds

3.4.2 Member Function Documentation

3.4.2.1 void Buzzer::playSound (int *sound*) `[virtual]`

Play a sound

Choose wich sound to play

Parameters

`in`	*sound*	The sound to play

Implements interface::Audio.

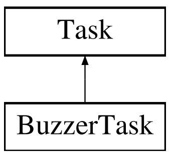
The documentation for this class was generated from the following files:

- src/output/Buzzer.h
- src/output/Buzzer.cpp

3.5 BuzzerTask Class Reference

```
#include <BuzzerTask.h>
```

Inheritance diagram for BuzzerTask:



Public Member Functions

- BuzzerTask (int, Context ∗)

  Init pin and context
- void init (int, void(∗)())

  Set the period time for the task execution and the behaviour
- void tick ()

  The function to execute when the scheduler gives the resources to the task

Data Fields

- Buzzer ∗ **buzzer**

Protected Attributes

- int **pin**

Additional Inherited Members

3.5.1 Detailed Description

Class to manage the behaviour of a buzzer

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

- src/task/BuzzerTask.h
- src/task/BuzzerTask.cpp

3.6 Context Class Reference

```
#include <Context.h>
```

Public Member Functions

- Context (int maxDistance, Multiplexer ∗mux)

  Construct and initialize the '**Context**'
- bool isPadlockOpen ()

  If the player has guessed and opened the padlock
- void setPadlockOpen (bool padlockOpen)

  Set the padlock's state
- bool isPadlockDetected ()

  If the player has guessed the secret position
- void setPadlockDetected (bool padlockDetected)

  Set the state of the padlock when user guess the secret position
- void setCurrentDistance (int currentDistance)

    Set the distance at which the padlock will open
- int getCurrentDistance ()

    Get the distance at which the padlock will open
- void setButtonPressed (bool buttonPressed)

    Set the state of the button if pressed
- bool isButtonPressed ()

    Get the state of the button
- void setNewLevel ()

    Set a new level
- uint8_t getDelta ()

    Get the margin of error for the distance
- uint8_t getLevel ()

    Get the level to play
- int getSecret ()

    Get the scret distance where the padlock will open
- void newRandomNumber ()

    Generate a new random number
- void setGameOver (bool gameOver)

    Set the game state
- bool isGameOver ()

    Get the stat of the game
- void setDangerLevel (uint8_t dangerLevel)

    Set the level at which the padlock will starts to break
- uint8_t getDangerLevel ()

    Get the current level of breakage of padlock
- void setLockpicking (bool state)

    Set if the padlock is found and the user starts to pick
- bool isLockpicking ()

    Get if the user start to lock-picking the padlock
- void carousel (uint8_t delay1, uint8_t delay2)

    Run a carousel with two led color

3.6.1 Detailed Description

Contains all status variable for the program.

It's used to share informations between task and coordinate them creating a simple game.

3.6.2 Constructor & Destructor Documentation

3.6.2.1 Context::Context (int *maxDistance*, **Multiplexer** ∗ *mux*) `[inline]`

Construct and initialize the 'Context'

Initialize all parameters of the game and set the random seed with analog output entropy

Parameters

in	*maxDistance*	Maximum distance game
in	*mux*	Multiplexer instance

3.6.3 Member Function Documentation

3.6.3.1 void Context::carousel (uint8_t *delay1*, uint8_t *delay2*) [inline]

Run a carousel with two led color

The carousel activate two circular array of 6 leds.

Parameters

in	*delay1*	The delay before change position
in	*delay2*	The delay before change position

3.6.3.2 void Context::setButtonPressed (bool *buttonPressed*) [inline]

Set the state of the button if pressed

Parameters

in	*buttonPressed*	The state of the button

3.6.3.3 void Context::setCurrentDistance (int *currentDistance*) [inline]

Set the distance at which the padlock will open

Parameters

in	*currentDistance*	The distance to set

3.6.3.4 void Context::setGameOver (bool *gameOver*) [inline]

Set the game state

Parameters

in	*gameOver*	The state of the game

3.6.3.5 void Context::setPadlockDetected (bool *padlockDetected*) [inline]

Set the state of the padlock when user guess the secret position

Parameters

in	*padlockDetected*	The state of the guessing part

3.6.3.6 void Context::setPadlockOpen (bool *padlockOpen*) [inline]

Set the padlock's state

Parameters

in	*padlockOpen*	The state of the padlock

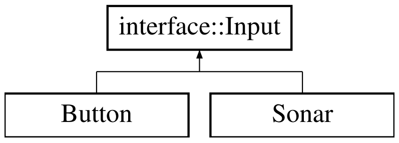
The documentation for this class was generated from the following file:

- src/control/Context.h

3.7 interface::Input Class Reference

```
#include <Input.h>
```

Inheritance diagram for interface::Input:



Public Member Functions

- virtual bool **readBool** ()
- virtual int **readDistance** ()

3.7.1 Detailed Description

Interface for input devices

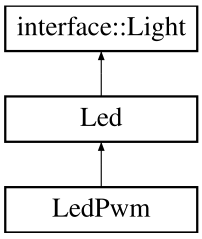
The documentation for this class was generated from the following file:

- src/interface/Input.h

3.8 Led Class Reference

```
#include <Led.h>
```

Inheritance diagram for Led:



Public Member Functions

- Led (int)

  Config the led's pin

Protected Member Functions

- void switchOn ()

  Turn the led on
- void switchOff ()

  Turn the led off

Protected Attributes

- int **pin**

3.8.1 Detailed Description

Class to manage a led

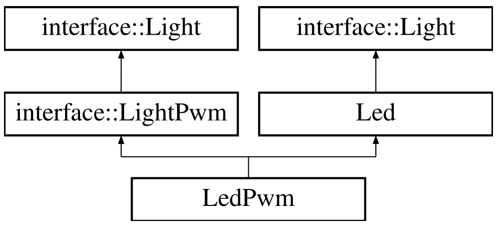
The documentation for this class was generated from the following files:

- src/output/Led.h
- src/output/Led.cpp

3.9 LedPwm Class Reference

```
#include <LedPwm.h>
```

Inheritance diagram for LedPwm:



Public Member Functions

- LedPwm (int)

  Config the led's pin
- LedPwm (int, int)

  Config the led's pin and init the intensity of the led
- void setIntensity (uint8_t)

  Set the intensity of the pwm led
- void switchOn ()

  Turn the led on
- void switchOff ()

  Turn the led off

Additional Inherited Members

3.9.1 Detailed Description

Class to manage a led with support for pwm

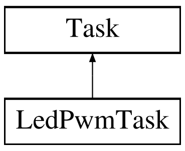
The documentation for this class was generated from the following files:

- src/output/LedPwm.h
- src/output/LedPwm.cpp

3.10 LedPwmTask Class Reference

```
#include <LedPwmTask.h>
```

Inheritance diagram for LedPwmTask:



Public Member Functions

- LedPwmTask (int, Context ∗)

  Init pin and context
- void init (int, void(∗)())

  Set the period time for the task execution and the behaviour
- void tick ()

  The function to execute when the scheduler gives the resources to the task

Data Fields

- interface::LightPwm ∗ **ledPwm**

Protected Attributes

- int **pin**

Additional Inherited Members

3.10.1 Detailed Description

Class to manage the behaviour of a led pwm

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

- src/task/LedPwmTask.h
- src/task/LedPwmTask.cpp

3.11 LedRgb Class Reference

```
#include <LedRgb.h>
```

Public Member Functions

- LedRgb (int, int, int)

  Config the led's pin
- void setColor (int, int, int)

  Set the color of the RGB led with a (red, green, blue) value

Protected Member Functions

- void switchOn ()

  Turn the led on
- void switchOff ()

  Turn the led off

3.11.1 Detailed Description

Class to manage a RGB led

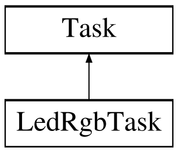
The documentation for this class was generated from the following files:

- src/output/LedRgb.h
- src/output/LedRgb.cpp

3.12 LedRgbTask Class Reference

`#include <LedRgbTask.h>`

Inheritance diagram for LedRgbTask:



Public Member Functions

- LedRgbTask (int, int, int, Context ∗)

  Init pins and context
- void init (int, void(∗)())

  Set the period time for the task execution and the behaviour
- void tick ()

  The function to execute when the scheduler gives the resources to the task

Data Fields

- LedRgb ∗ **ledRgb**

Protected Attributes

- int **pin1**
- int **pin2**
- int **pin3**

Additional Inherited Members

3.12.1 Detailed Description

Class to manage the behaviour of a RGB led

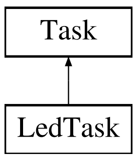
The documentation for this class was generated from the following files:

- src/task/LedRgbTask.h
- src/task/LedRgbTask.cpp

3.13 LedTask Class Reference

`#include <LedTask.h>`

Inheritance diagram for LedTask:



Public Member Functions

- LedTask (int, Context ∗)

  Init pin and context
- void init (int, void(∗)())

  Set the period time for the task execution and the behaviour
- void tick ()

  The function to execute when the scheduler gives the resources to the task

Data Fields

- interface::Light ∗ **led**

Protected Attributes

- int **pin**

Additional Inherited Members

3.13.1 Detailed Description

Class to manage the behaviour of a simple led

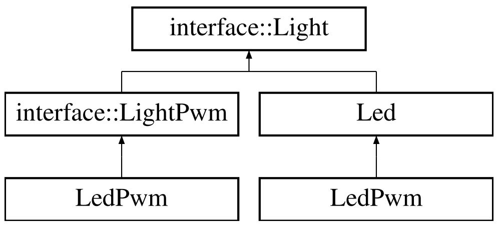
The documentation for this class was generated from the following files:

- src/task/LedTask.h
- src/task/LedTask.cpp

3.14 interface::Light Class Reference

```
#include <Light.h>
```

Inheritance diagram for interface::Light:



Public Member Functions

- virtual void **switchOn** ()=0
- virtual void **switchOff** ()=0

3.14.1 Detailed Description

Interface for devices that use light as a feedback

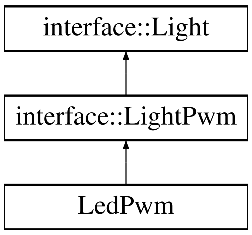
The documentation for this class was generated from the following file:

- src/interface/Light.h

3.15 interface::LightPwm Class Reference

```
#include <LightPwm.h>
```

Inheritance diagram for interface::LightPwm:



Public Member Functions

- virtual void **setIntensity** (uint8_t)=0

3.15.1 Detailed Description

Interface for devices that use a dimmable light as a feedback

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

- src/interface/LightPwm.h

3.16 MessageService Class Reference

```
#include <MessageService.h>
```

Public Member Functions

- void init (const int, const String &)

  Init the serial and print a welcome message
- void setMessage (String)

  Parse a message from the serial
- String **getMessage** ()
- void errorMsg ()

Send a message error using JSON

- void ackMsg (const String)

  Send an ACK using JSON
- void sendMsg (const String, const String)

  Send a message using JSON
- void sendInfo (const int, const int, const uint8_t, const String)

  Send a service message using JSON

3.16.1 Detailed Description

Class to read and write data on serial

3.16.2 Member Function Documentation

3.16.2.1 void MessageService::init (const int *baud,* const String & *name*)

Init the serial and print a welcome message

Parameters

`in`	*baud*	The baud rate of the serial
`in`	*name*	The message to print

3.16.2.2 void MessageService::sendInfo (const int *distance,* const int *status,* const uint8_t *level,* const String *to*)

Send a service message using JSON

Create and send a JSON message with informations about the status of the game.

Parameters

`in`	*distance*	The distance read from the sonar
`in`	*status*	The status of the game or the lockpicking phase
`in`	*to*	The receiver of the message

3.16.2.3 void MessageService::sendMsg (const String *content,* const String *receiver*)

Send a message using JSON

Create and send a JSON message to a receiver.

Parameters

`in`	*content*	The content of the message
`in`	*receiver*	The receiver of the message

3.16.2.4 void MessageService::setMessage (String *msg*)

Parse a message from the serial

When a message is readed is parsed and if is valid reply with an ACK

Parameters

`in`	*msg*	The message received

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

- src/output/MessageService.h
- src/output/MessageService.cpp

3.17 Multiplexer Class Reference

```
#include <Multiplexer.h>
```

Public Member Functions

- Multiplexer (int ∗, const int)

  Set the multiplex pins
- void switchOn (int)

  Select the output pin
- void carouselYellow (int)

  Run a 'carousel' effect on round led
- void **carouselRed** (int)

3.17.1 Detailed Description

Class to manage a 16-channels multiplexer (CD4067B)

3.17.2 Member Function Documentation

3.17.2.1 void Multiplexer::carouselYellow (int *del*)

Run a 'carousel' effect on round led

A round led is an array of 6 leds, set to HIGH each of the in sequence to create a 'carousel' effect. This led is binded with the multiplexer because Arduino Uno do not have enough pins.

Parameters

`in`	*del*	The delay time between each single shift

3.17.2.2 void Multiplexer::switchOn (int *output*)

Select the output pin

Select an output pin enabling the right channels using the truth table of the multiplexer

Parameters

`in`	*output*	The pin to be enabled

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

- src/output/Multiplexer.h
- src/output/Multiplexer.cpp

3.18 Scheduler Class Reference

`#include <Scheduler.h>`

Public Member Functions

- void **init** (int)
- virtual bool **addTask** (Task ∗)
- virtual void **schedule** ()

3.18.1 Detailed Description

Run with round robin scheduling all tasks

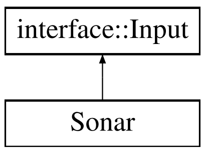
The documentation for this class was generated from the following files:

- src/control/Scheduler.h
- src/control/Scheduler.cpp

3.19 Sonar Class Reference

`#include <Sonar.h>`

Inheritance diagram for Sonar:



Public Member Functions

- Sonar (int, int, int)

  Create a new object to read value from sonar using 'NewPing' library

Protected Member Functions

- int readDistance ()

  Read the distance detected

Protected Attributes

- NewPing $*$ **mySonar**

3.19.1 Detailed Description

Class to manage the sonar (ultrasonic range detector)

3.19.2 Member Function Documentation

3.19.2.1 int Sonar::readDistance ( ) `[protected]`, `[virtual]`

Read the distance detected

Returns

The distance value in centimeters

Reimplemented from interface::Input.

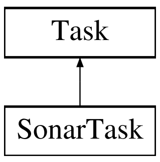
The documentation for this class was generated from the following files:

- src/input/Sonar.h
- src/input/Sonar.cpp

3.20 SonarTask Class Reference

```
#include <SonarTask.h>
```

Inheritance diagram for SonarTask:



Public Member Functions

- **SonarTask** (int, int, int, Context ∗)
- void **init** (int, void(∗)())
- void **tick** ()
- void **playLevel** ()

Data Fields

- interface::Input ∗ **sonar**

Protected Attributes

- int **echoPin**
- int **trigPin**
- int **maxDist**

Additional Inherited Members

3.20.1 Detailed Description

Class to manage the behaviour of the sonar

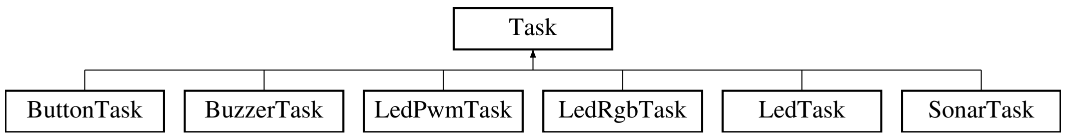
The documentation for this class was generated from the following files:

- src/task/SonarTask.h
- src/task/SonarTask.cpp

3.21 Task Class Reference

```
#include <Task.h>
```

Inheritance diagram for Task:



Public Member Functions

- virtual void **init** (int period)
- virtual void **tick** ()=0
- bool **isEnabled** ()
- void **enable** ()
- void **disable** ()
- bool updateAndCheckTime (int basePeriod)

Check if is time to do a context switch

Protected Member Functions

- virtual void lambdaTick ()=0

3.21.1 Detailed Description

Abstract class for tasks

3.21.2 Member Function Documentation

3.21.2.1 virtual void Task::lambdaTick ( ) [protected], [pure virtual]

The implementation of task

3.21.2.2 bool Task::updateAndCheckTime (int *basePeriod*) [inline]

Check if is time to do a context switch

Parameters

in	*basePeriod*	The period time of execution of the task

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

- src/task/Task.h

3.22 Timer Class Reference

```
#include <Timer.h>
```

Public Member Functions

- void **setupPeriod** (int)
- void **waitForNextTick** ()

3.22.1 Detailed Description

Class to manage Arduino internal timers

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

- src/control/Timer.h
- src/control/Timer.cpp