

DOXYGEN DOCUMENTATION
FEBRUARY 15, 2019

Potential Field Avoidance

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Contents

1	Namespace Index	1
1.1	Namespace List	1
2	Hierarchical Index	2
2.1	Class Hierarchy	2
3	Class Index	3
3.1	Class List	3
4	Namespace Documentation	4
4.1	pf_avoidance Namespace Reference	4
4.1.1	Detailed Description	4
4.1.2	Function Documentation	4
4.1.2.1	obstacleFunction()	5
5	Class Documentation	6
5.1	pf_avoidance.PotentialField Class Reference	6
5.1.1	Detailed Description	7
5.1.2	Member Function Documentation	7
5.1.2.1	addBoundaries()	7
5.1.2.2	addObstacle()	7
5.1.2.3	directionalDerivative()	8
5.1.2.4	Gradient()	8
5.1.2.5	Hessian()	8
5.1.2.6	Potential()	9
5.1.2.7	secondDirectionalDerivative()	9
	Index	10

Chapter 1

Namespace Index

1.1 Namespace List

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

pf_avoidance	4
--	---

Chapter 2

Hierarchical Index

2.1 Class Hierarchy

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

object	
pf_avoidance.PotentialField	6

Chapter 3

Class Index

3.1 Class List

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

pf_avoidance.PotentialField	6
---	---

Chapter 4

Namespace Documentation

4.1 pf_avoidance Namespace Reference

Classes

- class [PotentialField](#)

Functions

- def [obstacleFunction](#) (x, y, z, x_o, y_o, z_o, r_o, h_o)

4.1.1 Detailed Description

```
@package PF Avoidance
Functions for avoiding obstacles dynamically in a path-following setting.
...
```

4.1.2 Function Documentation



4.1.2.1 obstacleFunction()

```
def pf_avoidance.obstacleFunction (
    x,
    y,
    z,
    x_o,
    y_o,
    z_o,
    r_o,
    h_o )
```

Cost function for a single obstacle.

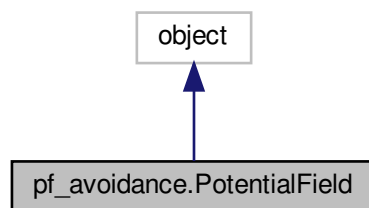
```
@param x scalar position.
@param y scalar position.
@param z scalar position.
```

Chapter 5

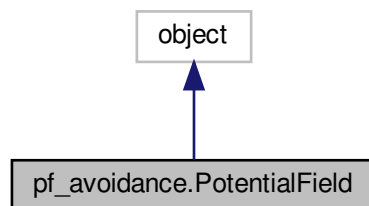
Class Documentation

5.1 pf_avoidance.PotentialField Class Reference

Inheritance diagram for pf_avoidance.PotentialField:



Collaboration diagram for pf_avoidance.PotentialField:





Static Public Member Functions

- def `addObstacle` (pn, pe, pd, r, h)
- def `addBoundaries` (filename_or_data)
- def `Potential` (x)
- def `Gradient` (x)
- def `Hessian` (x)
- def `directionalDerivative` (x, s)
- def `secondDirectionalDerivative` (x, s)

5.1.1 Detailed Description

Class for calculating potential function values and derivatives given obstacle and boundary positions.

TODO: ADD VISUALIZATION TOOLS

TODO: LOAD BOUNDARIES FROM FILE AND CALCULATE FORCES

5.1.2 Member Function Documentation

5.1.2.1 `addBoundaries()`

```
def pf_avoidance.PotentialField.addBoundaries (
    filename_or_data ) [static]
```

FUNCTIONALITY PENDING

5.1.2.2 `addObstacle()`

```
def pf_avoidance.PotentialField.addObstacle (
    pn,
    pe,
    pd,
    r,
    h ) [static]
```

Add an obstacle to the potential function.

```
@param pn Obstacle NORTH position (m)
@param pe Obstacle EAST position (m)
@param pd Obstacle DOWN position (m)
@param r Obstacle radius (m)
@param h Obstacle height (m)
```



5.1.2.3 **directionalDerivative()**

```
def pf_avoidance.PotentialField.directionalDerivative (
    x,
    s ) [static]
```

Calculate (scalar) directional derivative of a function at vector position x and unit vector direction s .

@param x The 3x1 np.array position x
@param s The 3x1 np.array direction s

5.1.2.4 **Gradient()**

```
def pf_avoidance.PotentialField.Gradient (
    x ) [static]
```

Calculate gradient of the potential at vector position x .

@param x The 3x1 np.array position x

5.1.2.5 **Hessian()**

```
def pf_avoidance.PotentialField.Hessian (
    x ) [static]
```

Calculate Hessian of the potential at vector position x .

@param x The 3x1 np.array position x



5.1.2.6 Potential()

```
def pf_avoidance.PotentialField.Potential (
    x ) [static]
```

Calculate potential at vector position x.

@param x The 3x1 np.array position x

5.1.2.7 secondDirectionalDerivative()

```
def pf_avoidance.PotentialField.secondDirectionalDerivative (
    x,
    s ) [static]
```

Calculate (scalar) second directional derivative of a function at vector position x and unit vector direction s.

@param x The 3x1 np.array position x

@param s The 3x1 np.array direction s

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

- pf_avoidance.py

Index

- addBoundaries
 - pf_avoidance::PotentialField, [7](#)
- addObstacle
 - pf_avoidance::PotentialField, [7](#)
- directionalDerivative
 - pf_avoidance::PotentialField, [7](#)
- Gradient
 - pf_avoidance::PotentialField, [8](#)
- Hessian
 - pf_avoidance::PotentialField, [8](#)
- obstacleFunction
 - pf_avoidance, [4](#)
- pf_avoidance, [4](#)
 - obstacleFunction, [4](#)
- pf_avoidance.PotentialField, [6](#)
- pf_avoidance::PotentialField
 - addBoundaries, [7](#)
 - addObstacle, [7](#)
 - directionalDerivative, [7](#)
 - Gradient, [8](#)
 - Hessian, [8](#)
 - Potential, [8](#)
 - secondDirectionalDerivative, [9](#)
- Potential
 - pf_avoidance::PotentialField, [8](#)
- secondDirectionalDerivative
 - pf_avoidance::PotentialField, [9](#)