PointCloud2BIM Library

1.0

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Contents

Chapter 1

PointCloud2BIM Library reference manual

The 3D laser scanning is a convenient and accessible technology to document the existing infrastructure including buildings. The output is set of data points in space, so called point clouds. While point clouds can be directly rendered and inspected, they need to be converted into BIM representation for efficient digital processing.

The PointCloud2BIM library provides a set of algorithms to facilitate the processing of Building Point Clouds and identification of fundamental entities, such as floors, rooms, walls and openings.

The PointCloud2BIM library is written in C++. It can be integrated into any BIM software to assist the conversion of point clouds into digital BIM representation.

This reference manual documents the API of the library.

Note, that the library can also be used as a standalone tool without any dependency on BIM software by offering a set of command line tools that can perform the typical steps in the trasformation from the point clouds to BIM representation.

The library can be obtained from Department of Mechanics, Faculty of Civil Engineering, Czech Technical University. Please contact Borek Patzak (borek.patzak@fsv.cvut.cz) for details.

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 BitGrid Class Reference

Public Member Functions

- BitGrid (int dimensions, struct BoundingBoxInfo &bbox, double step)

  Creates bitgrid with given dimensions.
- void reset ()

  Reset vector of points and resize it to current size.
- const std::vector< bool > & getPoints ()

  Get the points object.
- void getActiveCellsIndex (std::vector< int > &res)

  Put active index ids into a vector.
- BoundingBoxInfo & getBBox ()

  Get the bounding box struct.
- bool get (int i)

  Get grid item by coordinate index (1d or nth point in vector).
- bool get (int x, int y)

  Get grid item by coordinate indexes (2d).
- bool get (int x, int y, int z)

  Get grid item by coordinate indexes (3d).
- int getX (int i)

  Get x index coordinate from single vector index.
- int getY (int i)

  Get y index coordinate from single vector index.
- bool pointExists (PointXYZ &p)

  Check if points exists in our bit grid and if it is set true.
- PointXYZ getPoint (int i)

  Return a point from vector index.
- double getArea ()

  Get the area of our grid. Only works for 2d grids.
- int getActiveCells ()

  Get the number of active cells (marked as true).
- int getDimensions ()

  Get grid dimensions.
- int getSize ()

Get the size of our grid (length of vector).

- int getSizeX ()

  Get grid size in x direction.

- int getSizeY ()

  Get grid size in y direction.

- int getSizeZ ()

  Get grid size in z direction.

- double getStepX ()

  Get size of grid step in the x direction.

- double getStepY ()

  Get size of grid step in the y direction.

- double getStepZ ()

  Get size of grid step in the z direction.

- void invert ()

  Activate deactivated cells and deactivate activated. Used in backfill algorithm.

- void backfill ()

  Backfill holes in the activated grid. Useful for found rooms not to miss some inner points.

- bool add (PointXYZNormal &p)

  Activate grid cell. Cell coordinates are computed for the given point.

- bool add (PointXYZ &p)

  Activate grid cell. Cell coordinates are computed for the given point.

- void add (int i)

  Activate grid cell by 1d index.

- void add (int x, int y)

  Activate grid by integer x,y coordinates.

- void remove (int i)

  Deactivate grid cell by 1d index.

- std::vector< PointXYZ > getBoundingPolygon ()

  Returns bounding polygon.

- svg::Document toSVG (std::filesystem::path path)

  Saves BitGrid to SVG format.

5.1.1 Constructor & Destructor Documentation

5.1.1.1 BitGrid::BitGrid (int *dimensions*, struct BoundingBoxInfo & *bbox*, double *step*)

Creates bitgrid with given dimensions.

Parameters

dimensions	Number of dimensions
bbox	Bounding box of BitGrid to be created
step	Cell size

5.1.2 Member Function Documentation

5.1.2.1 bool BitGrid::add (PointXYZNormal & *p*)

Activate grid cell. Cell coordinates are computed for the given point.

Parameters

p	Point with X,Y,Z coordinates

Returns

True if cell was activated (index within grid bounds)
False if calculated grid index is out of bounds

5.1.2.2 bool BitGrid::add (PointXYZ & *p*)

Activate grid cell. Cell coordinates are computed for the given point.

Parameters

p	Point with X,Y,Z coordinates

Returns

True if cell was activated (index within grid bounds)
False if calculated grid index is out of bounds

5.1.2.3 void BitGrid::add (int *i*)

Activate grid cell by 1d index.

Parameters

i	Index of a cell to be activated

5.1.2.4 void BitGrid::add (int *x*, int *y*)

Activate grid by integer x,y coordinates.

Parameters

x	X grid coordinate
y	Y grid coordinate

5.1.2.5 bool BitGrid::get (int *i*)

Get grid item by coordinate index (1d or nth point in vector).

Parameters

i	Index in vector

Returns

True if index exists and is marked true
False if index doesnt exist or is marked false

5.1.2.6 bool BitGrid::get (int *x*, int *y*)

Get grid item by coordinate indexes (2d).

Parameters

x	X index
y	Y index

Returns

True if index exists and is marked true
False if index doesnt exist or is marked false

5.1.2.7 bool BitGrid::get (int *x*, int *y*, int *z*)

Get grid item by coordinate indexes (3d).

Parameters

x	X index
y	Y index
z	Z index

Returns

True if indexes exist and are marked true
False if indexes do not exist or are marked false

5.1.2.8 int BitGrid::getActiveCells ( )

Get the number of active cells (marked as true).

Returns

Number of active cells

5.1.2.9 void BitGrid::getActiveCellsIndex (std::vector< int > & *res*)

Put active index ids into a vector.

Parameters

res	Return parametr storing active cell indexes

5.1.2.10 double BitGrid::getArea ( )

Get the area of our grid. Only works for 2d grids.

Returns

Area in units squared

5.1.2.11 BoundingBoxInfo & BitGrid::getBBox ( )

Get the bounding box struct.

Returns

BoundingBoxInfo

5.1.2.12 std::vector< PointXYZ > BitGrid::getBoundingPolygon ( )

Returns bounding polygon.

Returns

Bounding polygon

5.1.2.13 int BitGrid::getDimensions ( )

Get grid dimensions.

Returns

1 for 1d, 2 for 2d, 3 for 3d

5.1.2.14 PointXYZ BitGrid::getPoint (int *i*)

Return a point from vector index.

Parameters

i	Index of a cell

Returns

PointXYZ

5.1.2.15 const std::vector< bool > & BitGrid::getPoints ( )

Get the points object.

Returns

Points object

5.1.2.16 int BitGrid::getSize ( )

Get the size of our grid (length of vector).

Returns

Number of cells

5.1.2.17 int BitGrid::getSizeX ( )

Get grid size in x direction.

Returns

Number of cells in the x direction

5.1.2.18 int BitGrid::getSizeY ( )

Get grid size in y direction.

Returns

Number of cells in the y direction

5.1.2.19 int BitGrid::getSizeZ ( )

Get grid size in z direction.

Returns

Number of cells in the z direction

5.1.2.20 double BitGrid::getStepX ( )

Get size of grid step in the x direction.

Returns

Size of the x step

5.1.2.21 double BitGrid::getStepY ( )

Get size of grid step in the y direction.

Returns

Size of the y step

5.1.2.22 double BitGrid::getStepZ ( )

Get size of grid step in the z direction.

Returns

Size of the z step

5.1.2.23 int BitGrid::getX (int *i*)

Get x index coordinate from single vector index.

Parameters

i	Index of the cell

Returns

X coordinate

5.1.2.24 int BitGrid::getY (int *i*)

Get y index coordinate from single vector index.

Parameters

i	Index of the cell

Returns

Y coordinate

5.1.2.25 bool BitGrid::pointExists (PointXYZ & *p*)

Check if points exists in our bit grid and if it is set true.

Parameters

p	Point to check

Returns

True if point is within grid bounds and flag is set to true
False if point doesn't exist in the grid or flag is se to false

5.1.2.26 void BitGrid::remove (int *i*)

Deactivate grid cell by 1d index.

Parameters

i	Index of a cell to be deactivated

5.1.2.27 svg::Document BitGrid::toSVG (std::filesystem::path *path*)

Saves BitGrid to SVG format.

Parameters

path	Path to file where to save the SVG

Returns

SVG Document

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

- /home/edita/spcl2/src/BitGrid.h
- /home/edita/spcl2/src/BitGrid.cpp

5.2 BoundingBoxInfo Struct Reference

Public Member Functions

- double range (int index)

Calculates range of the coordinate given by index.

- void giveBoundingBoxMin (double(&min)[3])

  Returns minimum coordinates of the BoundingBoxInfo object.
- void giveBoundingBoxMax (double(&max)[3])

  Returns maximum coordinates of the BoundingBoxInfo object.
- BoundingBoxInfo ()

  Construct a new BoundingBoxInfo object with infinities as bounds.

Public Attributes

- double min [3]

  Minimum coordinates [x, y, z] of the bounding box.
- double max [3]

  Maximum coordinates [x, y, z] of the bounding box.

5.2.1 Member Function Documentation

5.2.1.1 void BoundingBoxInfo::giveBoundingBoxMax (double(&) *max[3]*) [inline]

Returns maximum coordinates of the BoundingBoxInfo object.

Parameters

max	Maximum coordinates [x, y, z]

5.2.1.2 void BoundingBoxInfo::giveBoundingBoxMin (double(&) *min[3]*) [inline]

Returns minimum coordinates of the BoundingBoxInfo object.

Parameters

min	Minimum coordinates [x, y, z]

5.2.1.3 double BoundingBoxInfo::range (int *index*) [inline]

Calculates range of the coordinate given by index.

Parameters

index	Specifies for which component (0-x, 1-y, 2-z) to calculate the range

Returns

Max coordinate - min coordinate

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

- /home/edita/spcl2/src/BoundingBox.h

5.3 Cell Struct Reference

Public Member Functions

- bool operator== (const Cell &o) const

  Operator to compare two cells by index.

Public Attributes

- int index

  Cell index.
- double x = 0.0

  X coordinate of the cell (weighted average of all points)
- double y = 0.0

  Y coordinate of the cell (weighted average of all points)
- double z = 0.0

  Z coordinate of the cell (weighted average of all points)
- double normal [3]

  Calculated normal vector of a cell.
- int n = 0

  Number of points inside the cell.

Friends

- size_t hash_value (const Cell &p)

  Hash Cell for usage inside of a hash map.

5.3.1 Member Function Documentation

5.3.1.1 bool Cell::operator== (const Cell & *o*) const [inline]

Operator to compare two cells by index.

Parameters

o	Cell

Returns

True if cells are identical
False if cells indexes doesn't match

5.3.2 Friends And Related Function Documentation

5.3.2.1 size_t hash_value (const Cell & *p*) [friend]

Hash Cell for usage inside of a hash map.

Parameters

p	Cell to hash

Returns

Hash

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

- /home/edita/spcl2/src/Downsampler.h

5.4 Downsampler Class Reference

Public Member Functions

- Downsampler (double step)
  Constructs downsampler with equal step size in all directions.
- Downsampler (double x, double y, double z)
  Construct downsampler with given step sizes in x, y, z directions.
- void setStep (double step)
  Sets equal step size in all direction.
- void setStep (double x, double y, double z)
  Sets step sizes in x, y, z directions.
- int getIndex (int x, int y, int z)
  Returns location index given by x, y, z position.
- int getSize ()
  Returns map size.
- void setSizes (BoundingBoxInfo &bb)
  Sets sizes (in x, y, z direction) based on the given bounding box.
- bool isActive (int i)
  Decides whether the cell is active or not.
- void addPoint (PointXYZ &p)
  Adds given point to the map.
- void downsample (BoundingBoxInfo &bb, std::vector< PointXYZ > &points)
  Adds given points to the map specified by the bounding box.
- void getPoints (std::vector< PointXYZ > &pts)
  Returns points (with x, y, z coordinates) stored in the map.
- void getPoints (std::vector< PointXYZNormal > &pts)
  Returns points (with x, y, z coordinates and normal vector) stored in the map.
- void computeNormals ()
  Calculates normals.

5.4.1 Constructor & Destructor Documentation

5.4.1.1 Downsampler::Downsampler (double *step*) [inline]

Constructs downsampler with equal step size in all directions.

Parameters

step	Step to be set

5.4.1.2 Downsampler::Downsampler (double *x*, double *y*, double *z*) [inline]

Construct downsampler with given step sizes in x, y, z directions.

Parameters

x	Step to be set in x-direction
y	Step to be set in y-direction
z	Step to be set in z-direction

5.4.2 Member Function Documentation

5.4.2.1 void Downsampler::addPoint (PointXYZ & *p*) [inline]

Adds given point to the map.

Parameters

p	Point to be added

5.4.2.2 void Downsampler::downsample (BoundingBoxInfo & *bb*, std::vector< PointXYZ > & *points*) [inline]

Adds given points to the map specified by the bounding box.

Parameters

bb	Bounding box definig the map size
points	Points to be added

5.4.2.3 int Downsampler::getIndex (int *x*, int *y*, int *z*) [inline]

Returns location index given by x, y, z position.

Parameters

x	Position in x-direction
y	Position in y-direction
z	Position in z-direction

Returns

Calculated index

5.4.2.4 void Downsampler::getPoints (std::vector< PointXYZ > & *pts*) [inline]

Returns points (with x, y, z coordinates) stored in the map.

Parameters

pts	Return parametr storing the points

5.4.2.5 void Downsampler::getPoints (std::vector< PointXYZNormal > & *pts*) [inline]

Returns points (with x, y, z coordinates and normal vector) stored in the map.

Parameters

pts	Return parametr storing the points

5.4.2.6 int Downsampler::getSize ( ) [inline]

Returns map size.

Returns

Map size

5.4.2.7 bool Downsampler::isActive (int *i*) [inline]

Decides whether the cell is active or not.

Parameters

i	Cell index

Returns

True if cell is active
False if cell is inactive

5.4.2.8 void Downsampler::setSizes (BoundingBoxInfo & *bb*) [inline]

Sets sizes (in x, y, z direction) based on the given bounding box.

Parameters

bb	Bounding box based on which to set the size

5.4.2.9 void Downsampler::setStep (double *step*) [inline]

Sets equal step size in all direction.

Parameters

step	Step to be set

5.4.2.10 void Downsampler::setStep (double *x*, double *y*, double *z*) [inline]

Sets step sizes in x, y, z directions.

Parameters

x	Step to be set in x-direction
y	Step to be set in y-direction
z	Step to be set in z-direction

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

- /home/edita/spcl2/src/Downsampler.h

5.5 Floor Class Reference

Public Member Functions

- Floor ()
  Creates empty floor.
- void setId (int id)
  Sets Floor identifier.
- int getId () const
  Returns Floor identifier.
- const double * getMin () const
  Return Floor minimum coordinates.
- void setMin (double x, double y, double z)
  Sets minimum Floor coordinates.
- const double * getMax () const
  Return Floor maximum coordinates.
- void setMax (double x, double y, double z)
  Sets maximum Floor coordinates.

- void setFloorLevel (double l)

  Sets floor level (height).
- double getFloorLevel () const

  Returns floor level (height).
- void setCeilingLevel (double l)

  Sets ceiling level (height).
- double getCeilingLevel () const

  Returns ceiling level (height).
- std::vector< int > & getRoomIDs ()

  Returns vector of Room identifiers.
- void setRoomIDs (std::vector< int > room_ids)

  Set vector of Room indentifiers.
- const std::vector< Room > & getRooms () const

  Returns vector of Rooms.
- std::vector< Room > & getRooms ()

  Returns vector of Rooms.
- void addRoom (Room &room)

  Adds Room to Floor.
- std::vector< int > & getWallIDs ()

  Returns vector of Wall identifiers.
- void setWallIDs (std::vector< int > wall_ids)

  Sets vector of Wall identifiers.
- const std::vector< Wall > & getWalls () const

  Returns all Walls.
- std::vector< Wall > & getWalls ()

  Returns all Walls.
- void addWall (Wall &wall)

  Adds Wall to Floor.
- template<typename T >
  void getPoints (std::vector< T > &points)

  Returns all Floor points.

5.5.1 Member Function Documentation

5.5.1.1 void Floor::addRoom (Room & *room*) [inline]

Adds Room to Floor.

Parameters

room	Room to be added

5.5.1.2 void Floor::addWall (Wall & *wall*) [inline]

Adds Wall to Floor.

Parameters

wall	Wall

5.5.1.3 double Floor::getCeilingLevel ( ) const [inline]

Returns ceiling level (height).

Returns

Ceiling level

5.5.1.4 double Floor::getFloorLevel ( ) const [inline]

Returns floor level (height).

Returns

Floor level

5.5.1.5 int Floor::getId ( ) const [inline]

Returns Floor identifier.

Returns

Floor identifier

5.5.1.6 const double* Floor::getMax ( ) const [inline]

Return Floor maximum coordinates.

Returns

Array of maximum Floor coordinates

5.5.1.7 const double* Floor::getMin ( ) const [inline]

Return Floor minimum coordinates.

Returns

Array of minimum Floor coordinates

5.5.1.8 template<typename T > void Floor::getPoints (std::vector< T > & *points*) [inline]

Returns all Floor points.

Template Parameters

T	Point type

Parameters

points	Points

5.5.1.9 std::vector<int>& Floor::getRoomIDs ( ) [inline]

Returns vector of Room identifiers.

Returns

Room identifiers

5.5.1.10 const std::vector<Room>& Floor::getRooms ( ) const [inline]

Returns vector of Rooms.

Returns

Rooms

5.5.1.11 std::vector<Room>& Floor::getRooms ( ) [inline]

Returns vector of Rooms.

Returns

Rooms

5.5.1.12 std::vector<int>& Floor::getWallIDs ( ) [inline]

Returns vector of Wall identifiers.

Returns

Wall identifiers

5.5.1.13 const std::vector<Wall>& Floor::getWalls ( ) const [inline]

Returns all Walls.

Returns

Walls

5.5.1.14 std::vector<Wall>& Floor::getWalls ( ) [inline]

Returns all Walls.

Returns

Walls

5.5.1.15 void Floor::setCeilingLevel (double *l*) [inline]

Sets ceiling level (height).

Parameters

l	Ceiling level

5.5.1.16 void Floor::setFloorLevel (double *l*) [inline]

Sets floor level (height).

Parameters

l	Floor level

5.5.1.17 void Floor::setId (int *id*) [inline]

Sets Floor identifier.

Parameters

id	Floor identifier to be set

5.5.1.18 void Floor::setMax (double *x*, double *y*, double *z*) [inline]

Sets maximum Floor coordinates.

Parameters

x	Maximal x coordinate
y	Maximal y coordinate
z	Maximal z coordinate

5.5.1.19 void Floor::setMin (double *x*, double *y*, double *z*) [inline]

Sets minimum Floor coordinates.

Parameters

x	Minimal x coordinate
y	Minimal y coordinate
z	Minimal z coordinate

5.5.1.20 void Floor::setRoomIDs (std::vector< int > *room_ids*) [inline]

Set vector of Room indentifiers.

Parameters

room_ids	Room identifiers

5.5.1.21 void Floor::setWallIDs (std::vector< int > *wall_ids*) [inline]

Sets vector of Wall identifiers.

Parameters

wall_ids	Wall identifiers

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

- /home/edita/spcl2/src/Floor.h

5.6 Histogram Class Reference

Public Member Functions

- Histogram ()
  Constructs empty histogram.
- Histogram (BoundingBoxInfo &bbox, double step, int coord)
  Constructs histogram in given bounding box with step size in given direction.
- void addPoint (PointXYZ &p)
  Adds point to the histogram.
- void addPoint (PointXYZNormal &p)
  Adds point to the histogram.
- std::vector< HistogramInfo > getHistogram ()
  Returns HistogramInfo.

Static Public Member Functions

- static std::vector< HistogramInfo > computeHistogram (std::vector< PointXYZ > &points, BoundingBoxInfo &bbox, double step, int coord)

  Calculates histogram.

5.6.1 Constructor & Destructor Documentation

5.6.1.1 Histogram::Histogram (BoundingBoxInfo & *bbox*, double *step*, int *coord*) [inline]

Constructs histogram in given bounding box with step size in given direction.

Parameters

bbox	Bounding box specifying the histogram ranges
step	Step size
coord	Coordinate for which to calculate the histogram

5.6.2 Member Function Documentation

5.6.2.1 void Histogram::addPoint (PointXYZ & *p*) [inline]

Adds point to the histogram.

Parameters

p	Point to be added

5.6.2.2 void Histogram::addPoint (PointXYZNormal & *p*) [inline]

Adds point to the histogram.

Parameters

p	Point to be added

5.6.2.3 static std::vector<HistogramInfo> Histogram::computeHistogram (std::vector< PointXYZ > & *points*, BoundingBoxInfo & *bbox*, double *step*, int *coord*) [inline], [static]

Calculates histogram.

Parameters

points	Points for histogram calculation

Parameters

bbox	Calculation bounding box
step	Histogram step
coord	Histogram direction

Returns

HistogramInfo

5.6.2.4 std::vector<HistogramInfo> Histogram::getHistogram ( ) [inline]

Returns HistogramInfo.

Returns

HistogramInfo

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

- /home/edita/spcl2/src/Histogram.h

5.7 HistogramInfo Struct Reference

Public Attributes

- int index = 0

  Order of histogram step (to be preserved while sorting)
- double coordMin = 0

  Starting histogram step coordinate.
- double coordMax = 0

  Ending histogram step coordinate.
- int n = 0

  Number of points inside the histogram step.
- double relative = 0.0

  Relative percentage of points in the histogram step.

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

- /home/edita/spcl2/src/Histogram.h

5.8 Opening Class Reference

Public Member Functions

- Opening ()
  Creates empty Opening.
- int getId () const
  Returns Opening identifier.
- void setId (int id)
  Sets Opening identifier.
- std::vector< int > & getPointCloudIDs ()
  Returns vector of PointCloud identifiers.
- void setPointCloudIDs (std::vector< int > pcl_ids)
  Sets vector of PointCloud identifiers.
- const std::vector< PointCloud > & getPointClouds () const
  Get all Opening pointclouds.
- std::vector< PointCloud > & getPointClouds ()
  Get all Opening pointclouds.
- void addPointCloud (PointCloud &pc)
  Adds PointCloud to Opening.
- void setDimensions (std::vector< double > dimensions)
  Sets dimensions vector.
- const std::vector< double > & getDimensions () const
  Returns dimensions vector.
- std::vector< double > & getDimensions ()
  Returns dimensions vector.
- void setCornersX (std::vector< double > cornersX)
  Sets x coordinates of the points (corners) specifying Opening.
- const std::vector< double > & getCornersX () const
  Returns x coordinates of the points (corners) specifying Opening.
- void setCornersY (std::vector< double > cornersY)
  Sets y coordinates of the points (corners) specifying Opening.
- const std::vector< double > & getCornersY () const
  Returns x coordinates of the points (corners) specifying Opening.
- void setCornersZ (std::vector< double > cornersZ)
  Sets z coordinates of the points (corners) specifying Opening.
- const std::vector< double > & getCornersZ () const
  Returns z coordinates of the points (corners) specifying Opening.
- OpeningType getOpeningType () const
  Returns type of the opening.
- void setOpeningType (OpeningType name)
  Sets type of the opening.
- template<typename T >
  void getPoints (std::vector< T > &points)
  Returns all Opening points.

5.8.1 Member Function Documentation

5.8.1.1 void Opening::addPointCloud (PointCloud & *pc*) [inline]

Adds PointCloud to Opening.

Parameters

pc	PointCloud

5.8.1.2 const std::vector<double>& Opening::getCornersX ( ) const [inline]

Returns x coordinates of the points (corners) specifying Opening.

Returns

X coordinates of the corner points

5.8.1.3 const std::vector<double>& Opening::getCornersY ( ) const [inline]

Returns x coordinates of the points (corners) specifying Opening.

Returns

Y coordinates of the corner points

5.8.1.4 const std::vector<double>& Opening::getCornersZ ( ) const [inline]

Returns z coordinates of the points (corners) specifying Opening.

Returns

Z coordinates of the corner points

5.8.1.5 const std::vector<double>& Opening::getDimensions ( ) const [inline]

Returns dimensions vector.

Returns

Dimensions

5.8.1.6 std::vector<double>& Opening::getDimensions ( ) [inline]

Returns dimensions vector.

Returns

Dimensions

5.8.1.7 int Opening::getId ( ) const [inline]

Returns Opening identifier.

Returns

Opening identifier

5.8.1.8 OpeningType Opening::getOpeningType ( ) const [inline]

Returns type of the opening.

Returns

Opening type

5.8.1.9 std::vector<int>& Opening::getPointCloudIDs ( ) [inline]

Returns vector of PointCloud identifiers.

Returns

PointCloud identifiers

5.8.1.10 const std::vector<PointCloud>& Opening::getPointClouds ( ) const [inline]

Get all Opening pointclouds.

Returns

PointClouds

5.8.1.11 std::vector<PointCloud>& Opening::getPointClouds ( ) [inline]

Get all Opening pointclouds.

Returns

PointClouds

5.8.1.12 template<typename T > void Opening::getPoints (std::vector< T > & *points*) [inline]

Returns all Opening points.

Template Parameters

T	Point type

Parameters

points	Points

5.8.1.13 void Opening::setCornersX (std::vector< double > *cornersX*) [inline]

Sets x coordinates of the points (corners) specifying Opening.

Parameters

cornersX	X coordinates of the corner points

5.8.1.14 void Opening::setCornersY (std::vector< double > *cornersY*) [inline]

Sets y coordinates of the points (corners) specifying Opening.

Parameters

cornersY	Y coordinates of the corner points

5.8.1.15 void Opening::setCornersZ (std::vector< double > *cornersZ*) [inline]

Sets z coordinates of the points (corners) specifying Opening.

Parameters

cornersZ	Z coordinates of the corner points

5.8.1.16 void Opening::setDimensions (std::vector< double > *dimensions*) [inline]

Sets dimensions vector.

Parameters

dimensions	Dimensions

5.8.1.17 void Opening::setId (int *id*) [inline]

Sets Opening identifier.

Parameters

id	Opening identifier

5.8.1.18 void Opening::setOpeningType (OpeningType *name*) [inline]

Sets type of the opening.

Parameters

name	Opening type

5.8.1.19 void Opening::setPointCloudIDs (std::vector< int > *pcl_ids*) [inline]

Sets vector of PointCloud identifiers.

Parameters

pcl_ids	PointCloud identifiers

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

- /home/edita/spcl2/src/Opening.h

5.9 Plane Class Reference

Public Member Functions

- Plane ()
  Creates empty plane.
- Plane (double _a, double _b, double _c, double _d)
  Creates plane from given plane coefficients ($ax + by + cz + d = 0$).
- Plane (Vector3 _a, Vector3 _b, Vector3 _c)
  Creates plane from the coordinates (x,y,z) of the three given points.
- Plane (PointXYZ _a, PointXYZ _b, PointXYZ _c)
  Creates plane from three given points (PointXYZNormal).
- Plane (PointXYZNormal _a, PointXYZNormal _b, PointXYZNormal _c)
  Creates plane from three given points (PointXYZNormal).
- const double * getNormal () const
  Returns plane normal vector.

- double * getNormal ()

  Returns plane normal vector.
- void setNormal (double nx, double ny, double nz)

  Sets plane normal vector.
- const double * getMin () const

  Returns minimum coordinates.
- void setMin (double x, double y, double z)

  Sets minimum coordinates.
- const double * getMax () const

  Returns maximum coordinates.
- void setMax (double x, double y, double z)

  Sets maximum coordinates.
- int getId () const

  Returns Plane identifier.
- void setId (int id)

  Sets Plane identifier.
- int getFloorId () const

  Returns Floor identifier.
- void setFloorId (int id)

  Sets Floor identifier.
- double getD () const

  Returns coefficient d (Plane = $ax + by + cz + d = 0$).
- void setD (double d)

  Sets coefficient d (Plane = $ax + by + cz + d = 0$).
- std::vector< int > & getPointCloudIDs ()

  Returns Plane PointClouds identifiers.
- void **setPointCloudIDs** (std::vector< int > pcl_ids)
- const std::vector< PointCloud > & getPointClouds () const

  Returns Plane PointClouds.
- std::vector< PointCloud > & getPointClouds ()

  Returns Plane PointClouds.
- void addPointCloud (PointCloud &pc)

  Adds PointCloud to the Plane.
- template<typename T >
  void getPoints (std::vector< T > &points)

  Returns Plane Points.
- Vector3 getNormalVector ()

  Returns Plane normal vector.
- double distanceTo (Vector3 &v)

  Returns the distance between the receiver and the given point.
- double distanceTo (PointXYZ &p)

  Returns the distance between the receiver and the given point.
- double distanceTo (PointXYZNormal p)

  Returns the distance between the receiver and the given point.
- double **distanceTo** (std::vector< PointXYZ > &points)
- double distanceTo (std::vector< PointXYZNormal > &points)

  Returns the distance between the receiver and the given point.

Static Public Member Functions

- static double **angleBetween** (double a1, double b1, double c1, double a2, double b2, double c2)
- static void **getLocalContinuity** (std::vector< PointXYZ > points1, std::vector< PointXYZ > points2, std::vector< int > &result)
- static void getLocalMatch (std::vector< PointXYZNormal > points1, std::vector< PointXYZNormal > points2, std::vector< int > &result1, std::vector< int > &result2)

  Search for the overlapping points of two given planes.
- static bool makeWall (Plane &plane1, Plane &plane2, std::vector< PointXYZ > &result1, std::vector< PointXYZ > &result2)

  Search for the overlapping points of two given planes.
- static double checkLocalMatch (std::vector< PointXYZNormal > points1, std::vector< PointXYZNormal > points2)

  Returns the ratio of the overlapping area of two planes over the area of the smaller plane.
- static double checkMatchingArea (std::vector< PointXYZNormal > points1, std::vector< PointXYZNormal > points2)

  Returns the size of the overlapping area of two planes.
- static void giveCenterPlane (std::vector< PointXYZNormal > points1, std::vector< PointXYZNormal > points2, double(&v1)[3], double(&v2)[3], double(&v3)[3], double &d, std::vector< PointXYZNormal > &corners)

  Calculates the centerplane between the two given planes.
- static bool isInnerPlane (std::vector< PointXYZNormal > points, std::vector< BitGrid > roomGrids, double minOffset)

  Evaluates whether the plane is inner (between two rooms) or not (at the pointcloud boundary).
- static bool generateOuterPlane (std::vector< PointXYZNormal > points, std::vector< PointXYZNormal > &outPoints, std::vector< BitGrid > roomGrids, double minOffset)

  Generates a copy of the plane at the pointcloud boundary with given offset.
- static double distanceBetweenPlanes (Plane &pl1, Plane &pl2)

  Returns distance between planes with same a, b, c coefficients.

5.9.1 Constructor & Destructor Documentation

5.9.1.1 Plane::Plane (double *_a*, double *_b*, double *_c*, double *_d*) [inline]

Creates plane from given plane coefficients ($ax + by + cz + d = 0$).

Parameters

a	Coefficient a
b	Coefficient b
c	Coefficient c
d	Coefficient d

5.9.1.2 Plane::Plane (Vector3 _a, Vector3 _b, Vector3 _c) [inline]

Creates plane from the coordinates (x,y,z) of the three given points.

Parameters

↩ _↩ *a*	Vector of the coordinates of the point 1
↩ _↩ *b*	Vector of the coordinates of the point 2
↩ _↩ *c*	Vector of the coordinates of the point 3

5.9.1.3 Plane::Plane (PointXYZ _a, PointXYZ _b, PointXYZ _c) [inline]

Creates plane from three given points (PointXYZNormal).

Parameters

↩ _↩ *a*	Point 1
↩ _↩ *b*	Point 2
↩ _↩ *c*	Point 3

5.9.1.4 Plane::Plane (PointXYZNormal _a, PointXYZNormal _b, PointXYZNormal _c) [inline]

Creates plane from three given points (PointXYZNormal).

Parameters

↩ _↩ *a*	Point 1
↩ _↩ *b*	Point 2
↩ _↩ *c*	Point 3

5.9.2 Member Function Documentation

5.9.2.1 void Plane::addPointCloud (PointCloud & *pc*) [inline]

Adds PointCloud to the Plane.

Parameters

pc	PointCloud to be added

5.9.2.2 static double Plane::checkLocalMatch (std::vector< PointXYZNormal > *points1*, std::vector< PointXYZNormal > *points2*) [inline], [static]

Returns the ratio of the overlapping area of two planes over the area of the smaller plane.

Parameters

points1	Points of the first plane
points2	Points of the second plane

Returns

Matched percentage

5.9.2.3 static double Plane::checkMatchingArea (std::vector< PointXYZNormal > *points1*, std::vector< PointXYZNormal > *points2*) [inline], [static]

Returns the size of the overlapping area of two planes.

Parameters

points1	Points of the first plane
points2	Points of the second plane

Returns

Matching area

5.9.2.4 static double Plane::distanceBetweenPlanes (Plane & *pl1*, Plane & *pl2*) [inline], [static]

Returns distance between planes with same a, b, c coefficients.

Parameters

pl1	The first plane
pl2	The second plane

Returns

Calculated distance

5.9.2.5 double Plane::distanceTo (Vector3 & *v*) [inline]

Returns the distance between the receiver and the given point.

Parameters

v	Vector of the coordinates (x, y, z) of the point to which the distance is calculated

Returns

Distance of the point to the plane

5.9.2.6 double Plane::distanceTo (PointXYZ & *p*) [inline]

Returns the distance between the receiver and the given point.

Parameters

p	Point to which the distance is calculated

Returns

Distance of the point to the plane

5.9.2.7 double Plane::distanceTo (PointXYZNormal *p*) [inline]

Returns the distance between the receiver and the given point.

Parameters

p	Point to which the distance is calculated

Returns

Distance of the point to the plane

5.9.2.8 double Plane::distanceTo (std::vector< PointXYZNormal > & *points*) [inline]

Returns the distance between the receiver and the given point.

Parameters

p	Point to which the distance is calculated

Returns

Distance of the point to the plane

5.9.2.9 static bool Plane::generateOuterPlane (std::vector< PointXYZNormal > *points*, std::vector< PointXYZNormal > & *outPoints*, std::vector< BitGrid > *roomGrids*, double *minOffset*) [inline], [static]

Generates a copy of the plane at the pointcloud boundary with given offset.

Parameters

points	Points of the plane to be copied
outPoints	Return parameter storing points of the newly generated plane
roomGrids	Vector of grids of all rooms in the pointcloud
minOffset	Parameter defining the offset (in the normal direction, positive value $\sim$ out of the pointcloud) of the newly generated plane

Returns

True if plane is inner
False if plane is at the pointcloud boundary

5.9.2.10 double Plane::getD ( ) const [inline]

Returns coefficient d (Plane = $ax + by + cz + d = 0$).

Returns

Coefficient d

5.9.2.11 int Plane::getFloorId ( ) const [inline]

Returns Floor identifier.

Returns

Floor identifier

5.9.2.12 int Plane::getId ( ) const [inline]

Returns Plane identifier.

Returns

Plane identifier

5.9.2.13 static void Plane::getLocalMatch (std::vector< PointXYZNormal > *points1,* std::vector< PointXYZNormal > *points2,* std::vector< int > & *result1,* std::vector< int > & *result2*) [inline], [static]

Search for the overlapping points of two given planes.

Parameters

points1	Points of the first plane
points2	Points of the second plane
result1	Indexes of the points1 which are overlapping with the second plane
result2	Indexes of the points2 which are overlapping with the first plane

5.9.2.14 const double* Plane::getMax ( ) const [inline]

Returns maximum coordinates.

Returns

Maximum coordinates [x, y, z]

5.9.2.15 const double* Plane::getMin ( ) const [inline]

Returns minimum coordinates.

Returns

Minimum coordinates [x, y, z]

5.9.2.16 const double* Plane::getNormal ( ) const [inline]

Returns plane normal vector.

Returns

Plane normal vector.

5.9.2.17 double* Plane::getNormal ( ) [inline]

Returns plane normal vector.

Returns

Plane normal vector.

5.9.2.18 Vector3 Plane::getNormalVector ( ) [inline]

Returns Plane normal vector.

Returns

Normal vector

5.9.2.19 std::vector<int>& Plane::getPointCloudIDs ( ) [inline]

Returns Plane PointClouds identifiers.

Returns

PointClouds identifiers

5.9.2.20 const std::vector<PointCloud>& Plane::getPointClouds ( ) const [inline]

Returns Plane PointClouds.

Returns

Plane PointClouds

5.9.2.21 std::vector<PointCloud>& Plane::getPointClouds ( ) [inline]

Returns Plane PointClouds.

Returns

Plane PointClouds

5.9.2.22 template<typename T > void Plane::getPoints (std::vector< T > & *points*) [inline]

Returns Plane Points.

Parameters

points	Return parametr storing Plane points

5.9.2.23 static void Plane::giveCenterPlane (std::vector< PointXYZNormal > *points1*, std::vector< PointXYZNormal > *points2*, double(&) *v1[3]*, double(&) *v2[3]*, double(&) *v3[3]*, double & *d*, std::vector< PointXYZNormal > & *corners*) [inline], [static]

Calculates the centerplane between the two given planes.

Parameters

points1	Plane 1
points2	Plane 2
v1	Return parameter corresponding to the normal vector of the calculated centerplane
v2	Return parameter corresponding to the in-plane vector of the calculated centerplane
v3	Return parameter corresponding to the in-plane vector of the calculated centerplane
d	Return parameter corresponding to coefficient d of the calculated plane
corners	Return parameter corresp[onding to the set of points defining the centerplane

5.9.2.24 static bool Plane::isInnerPlane (std::vector< PointXYZNormal > *points*, std::vector< BitGrid > *roomGrids*, double *minOffset*) [inline], [static]

Evaluates whether the plane is inner (between two rooms) or not (at the pointcloud boundary).

Parameters

points	Points of the plane to be evaluated
roomGrids	Vector of grids of all rooms in the pointcloud
minOffset	Parameter defining how far from the plane to search for the room

Returns

True if plane is inner
False if plane is at the pointcloud boundary

5.9.2.25 static bool Plane::makeWall (Plane & *plane1*, Plane & *plane2*, std::vector< PointXYZ > & *result1*, std::vector< PointXYZ > & *result2*) [inline], [static]

Search for the overlapping points of two given planes.

Parameters

points1	Points of the first plane
points2	Points of the second plane
result1	Return parametr storing indexes of the points1 which are overlapping with the second plane
result2	Return parametr storing indexes of the points2 which are overlapping with the first plane

5.9.2.26 void Plane::setD (double *d*) [inline]

Sets coefficient d (Plane = $ax + by + cz + d = 0$).

Parameters

d	Coefficient d to be set

5.9.2.27 void Plane::setFloorId (int *id*) [inline]

Sets Floor identifier.

Parameters

id	Floor identifier to be set

5.9.2.28 void Plane::setId (int *id*) [inline]

Sets Plane identifier.

Parameters

id	Plane identifier to be set

5.9.2.29 void Plane::setMax (double *x*, double *y*, double *z*) [inline]

Sets maximum coordinates.

Parameters

x	X coordinate to be set
y	Y coordinate to be set
z	Z coordinate to be set

5.9.2.30 void Plane::setMin (double *x*, double *y*, double *z*) [inline]

Sets minimum coordinates.

Parameters

x	X coordinate to be set
y	Y coordinate to be set
z	Z coordinate to be set

5.9.2.31 void Plane::setNormal (double *nx*, double *ny*, double *nz*) [inline]

Sets plane normal vector.

Parameters

nx	X component
ny	Y component
nz	Z component

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

- /home/edita/spcl2/src/Plane.h

5.10 Point< Dimensions > Class Template Reference

Public Member Functions

- double * getCoords ()
  Returns Point coordinates.
- virtual void setId (double id)
  Sets Point identifier.
- virtual int getId ()
  Returns Point identifier.

5.10.1 Member Function Documentation

5.10.1.1 template<int Dimensions> double* Point< Dimensions >::getCoords ( ) [inline]

Returns Point coordinates.

Returns

Point coordinates

5.10.1.2 template<int Dimensions> virtual int Point< Dimensions >::getId ( ) [inline], [virtual]

Returns Point identifier.

Returns

Point identifier

5.10.1.3 template<int Dimensions> virtual void Point< Dimensions >::setId (double *id*) [inline], [virtual]

Sets Point identifier.

Parameters

id	Point identifier to be set

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

- /home/edita/spcl2/src/Point.h

5.11 PointCloud Class Reference

Public Member Functions

- PointCloud ()=default

  Constructs empty PointCloud.
- PointCloud (std::string name)

  Constructs PointCloud with given name.
- void setId (double id)

  Sets PointCloud identifier.
- int getId () const

  Returns PointCloud identifier.
- std::string getName () const

  Returns PointCloud name.
- void setName (std::string name)

  Sets PointCloud name.
- PointType getPointType () const

  Returns PointType.
- void setPointType (PointType name)

  Sets PointType.
- fs::path getFilepath ()

  Returns path to the file storing the PointCloud.
- void setFilepath (fs::path filepath)

  Sets path to the file storing the PointCloud.
- void writePointsCount (int n)

  Saves number of points to the file storing the PointCloud.
- int getNumberOfPoints ()

  Returns number of points in the PointCloud.
- template<typename T >
  void writeXYZPoint (std::fstream &output, T &point)

  Saves the point to the file.
- void writeXYZNormalPoint (std::fstream &output, PointXYZ &point)

  Saves the point to the file.
- void writeXYZNormalPoint (std::fstream &output, PointXYZNormal &point)

  Saves the point to the file.
- template<typename T >
  void setPoints (std::vector< T > &points)

  Sets points of the PointCloud.
- void readXYZPoint (std::ifstream &infile, std::vector< PointXYZ > &points)

  Uploads points from the given file.
- void readXYZPoint (std::ifstream &infile, std::vector< PointXYZNormal > &points)

  Uploads points from the given file.
- void readXYZNormalPoint (std::ifstream &infile, std::vector< PointXYZNormal > &points)

  Uploads points from the given file.
- void readXYZNormalPoint (std::ifstream &infile, std::vector< PointXYZ > &points)

  Uploads points from the given file.
- template<typename T >
  void getPoints (std::vector< T > &points)

  Returns points stored in the PointCloud.

5.11.1 Constructor & Destructor Documentation

5.11.1.1 PointCloud::PointCloud (std::string *name*) [inline]

Constructs PointCloud with given name.

Parameters

name	PointCloud name

5.11.2 Member Function Documentation

5.11.2.1 fs::path PointCloud::getFilepath ( ) [inline]

Returns path to the file storing the PointCloud.

Returns

File path

5.11.2.2 int PointCloud::getId ( ) const [inline]

Returns PointCloud identifier.

Returns

PointCloud identifier

5.11.2.3 std::string PointCloud::getName ( ) const [inline]

Returns PointCloud name.

Returns

PointCloud name

5.11.2.4 int PointCloud::getNumberOfPoints ( ) [inline]

Returns number of points in the PointCloud.

Returns

Number of points

5.11.2.5 template<typename T > void PointCloud::getPoints (std::vector< T > & *points*) [inline]

Returns points stored in the PointCloud.

Parameters

points	Return parametr storing the points

5.11.2.6 PointType PointCloud::getPointType ( ) const [inline]

Returns PointType.

Returns

PointType (xyz/ xyznormal)

5.11.2.7 void PointCloud::readXYZNormalPoint (std::ifstream & *infile*, std::vector< PointXYZNormal > & *points*) [inline]

Uploads points from the given file.

Parameters

infile	File storing the PointCloud
points	Return parametr storing the uploaded points

5.11.2.8 void PointCloud::readXYZNormalPoint (std::ifstream & *infile*, std::vector< PointXYZ > & *points*) [inline]

Uploads points from the given file.

Parameters

infile	File storing the PointCloud
points	Return parametr storing the uploaded points

5.11.2.9 void PointCloud::readXYZPoint (std::ifstream & *infile*, std::vector< PointXYZ > & *points*) [inline]

Uploads points from the given file.

Parameters

infile	File storing the PointCloud
points	Return parametr storing the uploaded points

5.11.2.10 void PointCloud::readXYZPoint (std::ifstream & *infile*, std::vector< PointXYZNormal > & *points*) [inline]

Uploads points from the given file.

Parameters

infile	File storing the PointCloud
points	Return parametr storing the uploaded points

5.11.2.11 void PointCloud::setFilepath (fs::path *filepath*) [inline]

Sets path to the file storing the PointCloud.

Parameters

filepath	File path to be set

5.11.2.12 void PointCloud::setId (double *id*) [inline]

Sets PointCloud identifier.

Parameters

id	Identifier to be set

5.11.2.13 void PointCloud::setName (std::string *name*) [inline]

Sets PointCloud name.

Parameters

name	Name to be set

5.11.2.14 template<typename T > void PointCloud::setPoints (std::vector< T > & *points*) [inline]

Sets points of the PointCloud.

Parameters

points	Points to be saved

5.11.2.15 void PointCloud::setPointType (PointType *name*) [inline]

Sets PointType.

Parameters

name	PointType to be set (xyz/ xyznormal)

5.11.2.16 void PointCloud::writePointsCount (int *n*) [inline]

Saves number of points to the file storing the PointCloud.

Parameters

n	Number of points to be saved

5.11.2.17 void PointCloud::writeXYZNormalPoint (std::fstream & *output*, PointXYZ & *point*) [inline]

Saves the point to the file.

Parameters

output	File where to save the point
point	Point to be saved

5.11.2.18 void PointCloud::writeXYZNormalPoint (std::fstream & *output*, PointXYZNormal & *point*) [inline]

Saves the point to the file.

Parameters

output	File where to save the point
point	Point to be saved

5.11.2.19 template<typename T > void PointCloud::writeXYZPoint (std::fstream & *output*, T & *point*) [inline]

Saves the point to the file.

Parameters

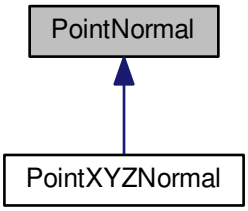
output	File where to save the point
point	Point to be saved

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

- /home/edita/spcl2/src/PointCloud.h

5.12 PointNormal Class Reference

Inheritance diagram for PointNormal:



Public Member Functions

- PointNormal ()

  Constructs PointNormal with components {0,0,0}.
- PointNormal (const PointNormal &p2)

  Constructs a copy of the given PointNormal.
- PointNormal (double x, double y, double z)

  Constructs PointNormal with given components.
- double * getNormal ()

  Returns PointNormal.
- virtual double getNx ()

  Returns PointNormal component in x-direction.
- virtual double getNy ()

  Returns PointNormal component in y-direction.
- virtual double getNz ()

  Returns PointNormal component in z-direction.
- virtual void setNx (double x)

  Sets PointNormal component in x-direction.
- virtual void setNy (double y)

  Sets PointNormal component in y-direction.
- virtual void setNz (double z)

  Sets PointNormal component in z-direction.

Protected Attributes

- double **normal** [3]

5.12.1 Constructor & Destructor Documentation

5.12.1.1 PointNormal::PointNormal (const PointNormal & *p2*) [inline]

Constructs a copy of the given PointNormal.

Parameters

p2	PointNormal to be copied

5.12.1.2 PointNormal::PointNormal (double *x*, double *y*, double *z*) [inline]

Constructs PointNormal with given components.

Parameters

x	Component in x-direction
y	Component in y-direction
z	Component in z-direction

5.12.2 Member Function Documentation

5.12.2.1 double* PointNormal::getNormal ( ) [inline]

Returns PointNormal.

Returns

PointNormal

5.12.2.2 virtual double PointNormal::getNx ( ) [inline], [virtual]

Returns PointNormal component in x-direction.

Returns

PointNormal component in x-direction

5.12.2.3 virtual double PointNormal::getNy ( ) [inline], [virtual]

Returns PointNormal component in y-direction.

Returns

PointNormal component in y-direction

5.12.2.4 virtual double PointNormal::getNz ( ) [inline], [virtual]

Returns PointNormal component in z-direction.

Returns

PointNormal component in z-direction

5.12.2.5 virtual void PointNormal::setNx (double *x*) [inline], [virtual]

Sets PointNormal component in x-direction.

Parameters

x	Component in x-direction

5.12.2.6 virtual void PointNormal::setNy (double *y*) [inline], [virtual]

Sets PointNormal component in y-direction.

Parameters

y	Component in y-direction

5.12.2.7 virtual void PointNormal::setNz (double *z*) [inline], [virtual]

Sets PointNormal component in z-direction.

Parameters

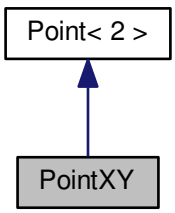
z	Component in z-direction

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

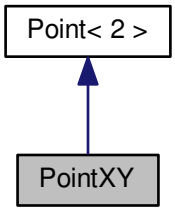
- /home/edita/spcl2/src/Point.h

5.13 PointXY Class Reference

Inheritance diagram for PointXY:



Collaboration diagram for PointXY:



Public Member Functions

- PointXY ()

  Constructs PointXY with coordinates {0,0}.
- PointXY (double x, double y)

  Constructs PointXY with given coordinates.
- double getX ()

  Returns x coordinate.
- double getY ()

  Returns y coordinate.
- void setX (double x)

  Sets x coordinate.
- void setY (double y)

  Sets y coordinate.

5.13.1 Constructor & Destructor Documentation

5.13.1.1 PointXY::PointXY (double *x*, double *y*) [inline]

Constructs PointXY with given coordinates.

Parameters

x	Coordinate in x-direction
y	Coordinate in y-direction

5.13.2 Member Function Documentation

5.13.2.1 double PointXY::getX ( ) [inline]

Returns x coordinate.

Returns

Coordinate in x-direction

5.13.2.2 double PointXY::getY ( ) [inline]

Returns y coordinate.

Returns

Coordinate in y-direction

5.13.2.3 void PointXY::setX (double *x*) [inline]

Sets x coordinate.

Parameters

x	Coordinate in x-direction

5.13.2.4 void PointXY::setY (double *y*) [inline]

Sets y coordinate.

Parameters

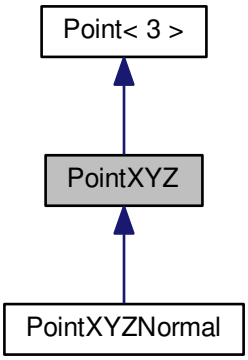
y	Coordinate in y-direction

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

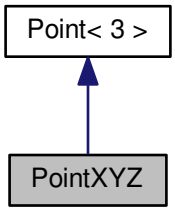
- /home/edita/spcl2/src/Point.h

5.14 PointXYZ Class Reference

Inheritance diagram for PointXYZ:



Collaboration diagram for PointXYZ:



Public Member Functions

- PointXYZ ()

  Constructs PointXYZ with coordinates {0,0,0}.
- PointXYZ (const PointXYZ &p2)

  Constructs a copy of the given PointXYZ.
- PointXYZ (double x, double y, double z)

  Constructs PointXYZ with given coordinates.
- virtual void setCoords (double x, double y, double z)

  Sets x, y, z coordinates.
- virtual double getX ()

  Returns x coordinate.
- virtual double getY ()

Returns y coordinate.

- virtual double getZ ()

  Returns z coordinate.

- virtual void setX (double x)

  Sets x coordinate.

- virtual void setY (double y)

  Sets y coordinate.

- virtual void setZ (double z)

  Sets z coordinate.

5.14.1 Constructor & Destructor Documentation

5.14.1.1 PointXYZ::PointXYZ (const PointXYZ & *p2*) [inline]

Constructs a copy of the given PointXYZ.

Parameters

p2	Point to be copied

5.14.1.2 PointXYZ::PointXYZ (double *x*, double *y*, double *z*) [inline]

Constructs PointXYZ with given coordinates.

Parameters

x	Coordinate in x-direction
y	Coordinate in y-direction
z	Coordinate in z-direction

5.14.2 Member Function Documentation

5.14.2.1 virtual double PointXYZ::getX ( ) [inline], [virtual]

Returns x coordinate.

Returns

Coordinate in x-direction

5.14.2.2 virtual double PointXYZ::getY ( ) [inline], [virtual]

Returns y coordinate.

Returns

Coordinate in y-direction

5.14.2.3 virtual double PointXYZ::getZ ( ) [inline], [virtual]

Returns z coordinate.

Returns

Coordinate in z-direction

5.14.2.4 virtual void PointXYZ::setCoords (double *x*, double *y*, double *z*) [inline], [virtual]

Sets x, y, z coordinates.

Parameters

x	Coordinate in x-direction
y	Coordinate in y-direction
z	Coordinate in z-direction

5.14.2.5 virtual void PointXYZ::setX (double *x*) [inline], [virtual]

Sets x coordinate.

Parameters

x	Coordinate in x-direction

5.14.2.6 virtual void PointXYZ::setY (double *y*) [inline], [virtual]

Sets y coordinate.

Parameters

y	Coordinate in y-direction

5.14.2.7 virtual void PointXYZ::setZ (double *z*) [inline], [virtual]

Sets z coordinate.

Parameters

z	Coordinate in z-direction

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

- /home/edita/spcl2/src/Point.h

5.15 PointXYZInfo Struct Reference

Public Attributes

- double x = 0.0

  X coordinate.
- double y = 0.0

  Y coordinate.
- double z = 0.0

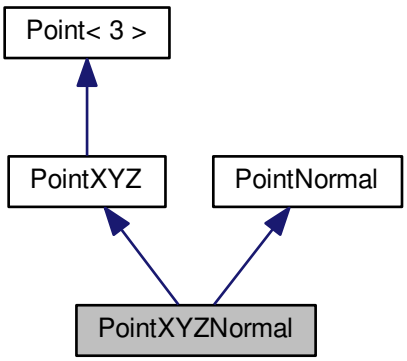
  Z coordinate.

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

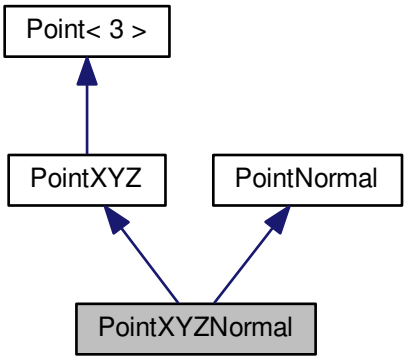
- /home/edita/spcl2/src/Point.h

5.16 PointXYZNormal Class Reference

Inheritance diagram for PointXYZNormal:



Collaboration diagram for PointXYZNormal:



Public Member Functions

- PointXYZNormal ()

  Constructs PointXYZNormal with coordinates {0,0,0}.
- PointXYZNormal (double x, double y, double z, double nx, double ny, double nz)

  Constructs PointXYZNormal with given coordinates and normal.
- PointXYZNormal (const PointXYZNormal &p2)

  Constructs a copy of the given PointXYZNormal.

Additional Inherited Members

5.16.1 Constructor & Destructor Documentation

5.16.1.1 PointXYZNormal::PointXYZNormal (double *x*, double *y*, double *z*, double *nx*, double *ny*, double *nz*) [inline]

Constructs PointXYZNormal with given coordinates and normal.

Parameters

x	Coordinate in x-direction
y	Coordinate in y-direction
z	Coordinate in z-direction
nx	Normal component in x-direction
ny	Normal component in y-direction
nz	Normal component in z-direction

5.16.1.2 PointXYZNormal::PointXYZNormal (const PointXYZNormal & *p2*) [inline]

Constructs a copy of the given PointXYZNormal.

Parameters

p2	Point to be copied

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

- /home/edita/spcl2/src/Point.h

5.17 PointXYZNormalInfo Struct Reference

Public Attributes

- double x = 0.0
  X coordinate.
- double y = 0.0
  Y coordinate.
- double z = 0.0
  Z coordinate.
- double nx = 0.0
  Normal component in x-direction.
- double ny = 0.0
  Normal component in y-direction.
- double nz = 0.0
  Normal component in z-direction.

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

- /home/edita/spcl2/src/Point.h

5.18 Polygon Class Reference

Public Member Functions

- Polygon ()
  Creates empty Polygon.
- void addPoint (PointXY &point)
  Add single point to Polygon.
- bool isPointInside (PointXYZ &point)
  Check if given point lies inside of Polygon.
- bool isPointInside (PointXY &point)
  Check if given point lies inside of Polygon.

5.18.1 Member Function Documentation

5.18.1.1 void Polygon::addPoint (PointXY & *point*) [inline]

Add single point to Polygon.

Parameters

point	Point to be added

5.18.1.2 bool Polygon::isPointInside (PointXYZ & *point*) [inline]

Check if given point lies inside of Polygon.

Parameters

point	Point to be checked

Returns

True if point lies inside Polygon
False if point lies outside Polygon

5.18.1.3 bool Polygon::isPointInside (PointXY & *point*) [inline]

Check if given point lies inside of Polygon.

Parameters

point	Point to be checked

Returns

True if point lies inside Polygon
False if point lies outside Polygon

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

- /home/edita/spcl2/src/Polygon.h

5.19 Project Class Reference

Public Member Functions

- Project (const fs::path &directory)

  Creates empty Project in a given directory path.
- Project (std::string project_name, const fs::path &full)

  Creates empty Project of a given name in a given directory path.
- std::string & getFolder ()

  Returns Project folder path.

- double * getTranslation ()

  Returns Project x, y, z translation.
- void setTranslation (double tx, double ty, double tz)

  Set Project x, y, z translation.
- void createProjectFile (const fs::path &path)

  Creates Project JSON file.
- void save ()

  Saves the Project JSON file.
- void openProjectFile (const fs::path &path)

  Opens the Project JSON file and read its contents.
- void addPointCloud (PointCloud &pc, bool force_save=true)

  Add PointCloud to Project.
- void update (PointCloud &p)

  Updates PointCloud after modifying.
- std::vector< PointCloud > & getPointClouds ()

  Returns all PointClouds.
- PointCloud & getPointCloud (int id)

  Returns a PointCloud by identifier.
- void addRoom (Room &r, bool force_save=true)

  Add Room to Project.
- void update (Room &r)

  Updates Room after modifying.
- std::vector< Room > & getRooms ()

  Returns all Rooms.
- Room & getRoom (int id)

  Returns a Room by identifier.
- void addFloor (Floor &f, bool force_save=true)

  Add Floor to Project.
- void update (Floor &f)

  Updates Floor after modifying.
- std::vector< Floor > & getFloors ()

  Returns all Floors.
- Floor & getFloor (int id)

  Returns a Floor by identifier.
- void addPlane (Plane &p, bool force_save=true)

  Add Plane to Project.
- void update (Plane &p)

  Updates Plane after modifying.
- std::vector< Plane > & getPlanes ()

  Returns all Planes.
- Plane & getPlane (int id)

  Returns a Plane by identifier.
- void addWall (Wall &p, bool force_save=true)

  Add Wall to Project.
- void update (Wall &p)

  Updates Wall after modifying.
- std::vector< Wall > & getWalls ()

  Returns all Walls.
- Wall & getWall (int id)

  Returns a Wall by identifier.
- void addOpening (Opening &p, bool force_save=true)

Add Opening to Project.

- void update (Opening &p)

  Updates Opening after modifying.
- std::vector< Opening > & getOpenings ()

  Returns all openings.
- Opening & getOpening (int id)

  Returns an Opening by identifier.
- void import (std::string filename, bool translate=false)

  Imports points from a .pts file (space separated x, y, z(, r, g, b, i) points).

5.19.1 Constructor & Destructor Documentation

5.19.1.1 Project::Project (const fs::path & *directory*) [inline]

Creates empty Project in a given directory path.

Parameters

directory	Directory path

Returns

5.19.1.2 Project::Project (std::string *project_name,* const fs::path & *full*) [inline]

Creates empty Project of a given name in a given directory path.

Parameters

project_name	Project name
full	Directory path

Returns

5.19.2 Member Function Documentation

5.19.2.1 void Project::addFloor (Floor & *f,* bool *force_save* = true) [inline]

Add Floor to Project.

Parameters

f	Floor to add
force_save	Whether to save JSON after adding

5.19.2.2 void Project::addOpening (Opening & *p*, bool *force_save* = `true`) [inline]

Add Opening to Project.

Parameters

p	Opening to add
force_save	Whether to save JSON after adding

5.19.2.3 void Project::addPlane (Plane & *p*, bool *force_save* = `true`) [inline]

Add Plane to Project.

Parameters

p	Plane to add
force_save	Whether to save JSON after adding

5.19.2.4 void Project::addPointCloud (PointCloud & *pc*, bool *force_save* = `true`) [inline]

Add PointCloud to Project.

Parameters

pc	Point cloud to add
force_save	Whether to save JSON after adding

5.19.2.5 void Project::addRoom (Room & *r*, bool *force_save* = `true`) [inline]

Add Room to Project.

Parameters

r	Room to add
force_save	Whether to save JSON after adding

5.19.2.6 void Project::addWall (Wall & *p*, bool *force_save* = `true`) [inline]

Add Wall to Project.

Parameters

p	Wall to add
force_save	Whether to save JSON after adding

5.19.2.7 void Project::createProjectFile (const fs::path & *path*) [inline]

Creates Project JSON file.

Parameters

path	File path

5.19.2.8 Floor& Project::getFloor (int *id*) [inline]

Returns a Floor by identifier.

Parameters

id	Floor identifier

Returns

Floor

5.19.2.9 std::vector<Floor>& Project::getFloors ( ) [inline]

Returns all Floors.

Returns

Floors

5.19.2.10 std::string& Project::getFolder ( ) [inline]

Returns Project folder path.

Returns

Project folder path

5.19.2.11 Opening& Project::getOpening (int *id*) [inline]

Returns an Opening by identifier.

Parameters

id	Opening identifier

Returns

Opening

5.19.2.12 std::vector<Opening>& Project::getOpenings ( ) [inline]

Returns all openings.

Returns

Openings

5.19.2.13 Plane& Project::getPlane (int *id*) [inline]

Returns a Plane by identifier.

Parameters

id	Plane identifier

Returns

Plane

5.19.2.14 std::vector<Plane>& Project::getPlanes ( ) [inline]

Returns all Planes.

Returns

Planes

5.19.2.15 PointCloud& Project::getPointCloud (int *id*) [inline]

Returns a PointCloud by identifier.

Parameters

id	Point cloud identifier

Returns

Point cloud

5.19.2.16 std::vector<PointCloud>& Project::getPointClouds ( ) [inline]

Returns all PointClouds.

Returns

Point clouds

5.19.2.17 Room& Project::getRoom (int *id*) [inline]

Returns a Room by identifier.

Parameters

id	Room identifier

Returns

Room

5.19.2.18 std::vector<Room>& Project::getRooms ( ) [inline]

Returns all Rooms.

Returns

Rooms

5.19.2.19 double* Project::getTranslation ( ) [inline]

Returns Project x, y, z translation.

Returns

Translation vector

5.19.2.20 Wall& Project::getWall (int *id*) [inline]

Returns a Wall by identifier.

Parameters

id	Wall identifier

Returns

Wall

5.19.2.21 std::vector<Wall>& Project::getWalls ( ) [inline]

Returns all Walls.

Returns

Walls

5.19.2.22 void Project::import (std::string *filename*, bool *translate* = false) [inline]

Imports points from a .pts file (space separated x, y, z(, r, g, b, i) points).

Parameters

filename	Path to import
translate	Specifies if imported points should be translated to bounding box minimum

5.19.2.23 void Project::openProjectFile (const fs::path & *path*) [inline]

Opens the Project JSON file and read its contents.

Parameters

path	

5.19.2.24 void Project::setTranslation (double *tx*, double *ty*, double *tz*) [inline]

Set Project x, y, z translation.

Parameters

tx	Translation in the x direction
ty	Translation in the y direction
tz	Translation in the z direction

5.19.2.25 void Project::update (PointCloud & *p*) [inline]

Updates PointCloud after modifying.

Parameters

p	PointCloud to update

5.19.2.26 void Project::update (Room & *r*) [inline]

Updates Room after modifying.

Parameters

r	Room to update

5.19.2.27 void Project::update (Floor & *f*) [inline]

Updates Floor after modifying.

Parameters

f	Floor to update

5.19.2.28 void Project::update (Plane & *p*) [inline]

Updates Plane after modifying.

Parameters

p	Plane to update

5.19.2.29 void Project::update (Wall & *p*) [inline]

Updates Wall after modifying.

Parameters

p	Wall to update

5.19.2.30 void Project::update (Opening & *p*) [inline]

Updates Opening after modifying.

Parameters

p	Opening to update

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

- /home/edita/spcl2/src/Project.h

5.20 PTXWriter Class Reference

Static Public Member Functions

- static void write (std::ofstream &file, std::vector< PointXYZ > &points)

  Writes given points in ∗.PTX file.
- static void write (std::ofstream &file, std::vector< PointXYZNormal > &points)

  Writes given points in ∗.PTX file.

5.20.1 Member Function Documentation

5.20.1.1 static void PTXWriter::write (std::ofstream & *file,* std::vector< **PointXYZ** > & *points*) [inline], [static]

Writes given points in ∗.PTX file.

Parameters

file	File where to write the output
points	Points to be writen

5.20.1.2 static void PTXWriter::write (std::ofstream & *file,* std::vector< **PointXYZNormal** > & *points*) [inline], [static]

Writes given points in ∗.PTX file.

Parameters

file	File where to write the output
points	Points to be writen

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

- /home/edita/spcl2/src/IO/PTXWriter.h

5.21 Room Class Reference

Public Member Functions

- Room ()
  Creates empty Room.
- void setId (double id)
  Sets Room identifier.
- int getId () const
  Returns room identifier.
- const double * getMin () const
  Returns Room minimum coordinates.
- void setMin (double x, double y, double z)
  Sets minimum Room coordinates.
- const double * getMax () const
  Returns Room maximum coordinates.
- void setMax (double x, double y, double z)
  Sets maximum Room coordinates.
- void setFloorLevel (double l)
  Sets floor level (height) of the specific Room.
- double getFloorLevel () const
  Returns floor level (height) of the specific Room.
- void setCeilingLevel (double l)
  Sets ceiling level (height) of the specific Room.
- double getCeilingLevel () const
  Returns ceiling level (height) of the specific Room.
- std::vector< int > & getPointCloudIDs ()
  Returns PointCloud identifiers.
- void setPointCloudIDs (std::vector< int > pcl_ids)
  Sets PointCloud identifiers.
- const std::vector< PointCloud > & getPointClouds () const
  Returns all Room PointClouds.
- std::vector< PointCloud > & getPointClouds ()
  Returns all Room PointClouds.
- void addPointCloud (PointCloud &pc)
  Adds PointCloud to Room.
- template<typename T >
  void getPoints (std::vector< T > &points)
  Returns all Room points.
- std::vector< int > & getPlaneIDs ()
  Returns Plane identifiers.
- void setPlaneIDs (std::vector< int > pcl_ids)
  Sets Plane identifiers.
- std::vector< Plane > & getPlanes ()
  Returns all Planes found in a Room.
- const std::vector< Plane > & getPlanes () const
  Returns all Planes found in a Room.
- void addPlane (Plane &pc)
  Adds a Plane to the Room.
- void setArea (double area)
  Sets floor plan area of the Room.
- double getArea () const
  Returns floor plan area of the Room.

5.21.1 Member Function Documentation

5.21.1.1 void Room::addPlane (Plane & *pc*) [inline]

Adds a Plane to the Room.

Parameters

pc	Plane to be added

5.21.1.2 void Room::addPointCloud (PointCloud & *pc*) [inline]

Adds PointCloud to Room.

Parameters

pc	PointCloud to be added

5.21.1.3 double Room::getArea ( ) const [inline]

Returns floor plan area of the Room.

Returns

Area [m^2]

5.21.1.4 double Room::getCeilingLevel ( ) const [inline]

Returns ceiling level (height) of the specific Room.

Returns

Ceiling level

5.21.1.5 double Room::getFloorLevel ( ) const [inline]

Returns floor level (height) of the specific Room.

Returns

Floor level

5.21.1.6 int Room::getId ( ) const [inline]

Returns room identifier.

Returns

Room identifier

5.21.1.7 const double* Room::getMax ( ) const [inline]

Returns Room maximum coordinates.

Returns

Maximum Room coordinates

5.21.1.8 const double* Room::getMin ( ) const [inline]

Returns Room minimum coordinates.

Returns

Minimum Room coordinates

5.21.1.9 std::vector<int>& Room::getPlaneIDs ( ) [inline]

Returns Plane identifiers.

Returns

Plane identifiers

5.21.1.10 std::vector<Plane>& Room::getPlanes ( ) [inline]

Returns all Planes found in a Room.

Returns

Room Planes

5.21.1.11 const std::vector<Plane>& Room::getPlanes ( ) const [inline]

Returns all Planes found in a Room.

Returns

Room Planes

5.21.1.12 std::vector<int>& Room::getPointCloudIDs ( ) [inline]

Returns PointCloud identifiers.

Returns

PointCloud identifiers

5.21.1.13 const std::vector<PointCloud>& Room::getPointClouds ( ) const [inline]

Returns all Room PointClouds.

Returns

Room PointClouds

5.21.1.14 std::vector<PointCloud>& Room::getPointClouds ( ) [inline]

Returns all Room PointClouds.

Returns

Room PointClouds

5.21.1.15 template<typename T > void Room::getPoints (std::vector< T > & *points*) [inline]

Returns all Room points.

Template Parameters

T	Point type

Parameters

points	Room Points

5.21.1.16 void Room::setArea (double *area*) [inline]

Sets floor plan area of the Room.

Parameters

Area	[m^2]

5.21.1.17 void Room::setCeilingLevel (double *l*) [inline]

Sets ceiling level (height) of the specific Room.

Parameters

l	Floor level

5.21.1.18 void Room::setFloorLevel (double *l*) [inline]

Sets floor level (height) of the specific Room.

Parameters

l	Floor level

5.21.1.19 void Room::setId (double *id*) [inline]

Sets Room identifier.

Parameters

id	Room identifier

5.21.1.20 void Room::setMax (double *x*, double *y*, double *z*) [inline]

Sets maximum Room coordinates.

Parameters

x	Maximum x coordinate
y	Maximum y coordinate
z	Maximum z coordinate

5.21.1.21 void Room::setMin (double *x*, double *y*, double *z*) [inline]

Sets minimum Room coordinates.

Parameters

x	Minimal x coordinate
y	Minimal y coordinate
z	Minimal z coordinate

5.21.1.22 void Room::setPlaneIDs (std::vector< int > *pcl_ids*) [inline]

Sets Plane identifiers.

Parameters

pcl_ids	Plane identifiers

5.21.1.23 void Room::setPointCloudIDs (std::vector< int > *pcl_ids*) [inline]

Sets PointCloud identifiers.

Parameters

pcl_ids	PointCloud identifiers

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

- /home/edita/spcl2/src/Room.h

5.22 Vector3 Class Reference

Public Member Functions

- Vector3 ()
  Creates a zero vector.
- Vector3 (double vx, double vy, double vz)
  Creates a new vector with specified coordinates.
- Vector3 (double vx, double vy)
  Creates a new 2D vector with specified coordinates.
- Vector3 (PointXYZ &p)
  Creates vector from 3D point.
- Vector3 (PointXYZNormal &p)
  Creates vector from 3D point with normals.
- Vector3 operator+ (const Vector3 &o)
  Operator for vector addition.
- Vector3 & operator+= (const Vector3 &o)
  Operator for addition to a vector.
- Vector3 operator- ()
  Operator for vector inversion.
- Vector3 operator- (const Vector3 o)
  Operator for vector subtraction.
- Vector3 & operator-= (const Vector3 o)
  Operator for subtraction from a vector.
- Vector3 operator∗ (const double s)
  Operator for vector multiplication.
- Vector3 & operator∗= (const double s)

Operator for vector multiplication.

- Vector3 operator/ (const double s)

  Operator for vector division.
- Vector3 & operator/= (const double s)

  Operator for vector division.
- double length ()

  Calculates length of a vector.
- double length_sqr ()

  Calculates squared length of a vector.
- Vector3 normalized ()

  Normalize vector.
- Vector3 & normalize ()

  Normalize vector.
- double operator∗ (const Vector3 o)

  Operator for dot product of two vectors.
- Vector3 operator^ (const Vector3 o)

  Calculates cross product of two vectors.
- Vector3 & operator^= (const Vector3 o)

  Calculates cross product of two vectors.

Public Attributes

- double x

  X component.
- double y

  Y component.
- double z

  Z component.

5.22.1 Constructor & Destructor Documentation

5.22.1.1 Vector3::Vector3 (double *vx*, double *vy*, double *vz*) [inline]

Creates a new vector with specified coordinates.

Parameters

vx	X component
vy	Y component
vz	Z component

5.22.1.2 Vector3::Vector3 (double *vx*, double *vy*) [inline]

Creates a new 2D vector with specified coordinates.

Parameters

vx	X component
vy	Y component

5.22.1.3 Vector3::Vector3 (PointXYZ & *p*) [inline]

Creates vector from 3D point.

Parameters

p	PointXYZ

5.22.1.4 Vector3::Vector3 (PointXYZNormal & *p*) [inline]

Creates vector from 3D point with normals.

Parameters

p	PointXYZNormal

5.22.2 Member Function Documentation

5.22.2.1 double Vector3::length ( ) [inline]

Calculates length of a vector.

Returns

Vector length

5.22.2.2 double Vector3::length_sqr ( ) [inline]

Calculates squared length of a vector.

Returns

Squared vector length

5.22.2.3 Vector3& Vector3::normalize ( ) [inline]

Normalize vector.

Returns

Normalized vector

5.22.2.4 Vector3 Vector3::normalized ( ) [inline]

Normalize vector.

Returns

Normalized vector

5.22.2.5 Vector3 Vector3::operator∗ (const double *s*) [inline]

Operator for vector multiplication.

Parameters

s	Scalar

Returns

New vector

5.22.2.6 double Vector3::operator∗ (const Vector3 *o*) [inline]

Operator for dot product of two vectors.

Parameters

o	Vector

Returns

Dot product

5.22.2.7 Vector3& Vector3::operator∗= (const double *s*) [inline]

Operator for vector multiplication.

Parameters

s	Scalar

Returns

Current vector

5.22.2.8 Vector3 Vector3::operator+ (const Vector3 & *o*) [inline]

Operator for vector addition.

Parameters

o	Vector to be added

Returns

New Vector

5.22.2.9 Vector3& Vector3::operator+= (const Vector3 & *o*) [inline]

Operator for addition to a vector.

Parameters

o	Vector to be added

Returns

Current vector

5.22.2.10 Vector3 Vector3::operator- ( ) [inline]

Operator for vector inversion.

Returns

New vector with reversed signs

5.22.2.11 Vector3 Vector3::operator- (const Vector3 *o*) [inline]

Operator for vector subtraction.

Parameters

o	Vector to be subtracted

Returns

New vector

5.22.2.12 Vector3& Vector3::operator-= (const Vector3 *o*) [inline]

Operator for subtraction from a vector.

Parameters

o	Vector to subtract

Returns

Current vector

5.22.2.13 Vector3 Vector3::operator/ (const double *s*) [inline]

Operator for vector division.

Parameters

s	Scalar

Returns

New vector

5.22.2.14 Vector3& Vector3::operator/= (const double *s*) [inline]

Operator for vector division.

Parameters

s	Scalar

Returns

Current vector

5.22.2.15 Vector3 Vector3::operator^ (const Vector3 *o*) [inline]

Calculates cross product of two vectors.

Parameters

o	Vector

Returns

Cross product

5.22.2.16 Vector3& Vector3::operator^= (const Vector3 *o*) [inline]

Calculates cross product of two vectors.

Parameters

o	Vector

Returns

Current vector

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

- /home/edita/spcl2/src/Vector3.h

5.23 Wall Class Reference

Public Member Functions

- Wall ()
  Creates empty Wall.
- int getId () const
  Returns Wall identifier.
- void setId (int id)
  Sets Wall identifier.
- int getFloorId () const
  Returns Floor identifier.
- void setFloorId (int id)
  Sets Floor identifier.
- bool isOuter () const
  Checks if wall is marked as outer.
- void setOuter (bool outer)
  Changes outer flag.
- std::vector< int > & getPlaneIDs ()
  Returns Plane identifiers.
- void setPlaneIDs (std::vector< int > pcl_ids)
  Sets Plane identifiers.
- const std::vector< Plane > & getPlanes () const
  Returns all Planes.
- std::vector< Plane > & getPlanes ()
  Returns all Planes.
- void addPlane (Plane &pc)

Adds a Plane to the Wall.

- std::vector< int > & getRoomIDs ()

  Returns Room identifiers.
- void setRoomIDs (std::vector< int > pcl_ids)

  Sets Room identifiers.
- const std::vector< Room > & getRooms () const

  Returns all Rooms.
- std::vector< Room > & getRooms ()

  Returns all Rooms.
- void addRoom (Room &room)

  Adds Room to the Wall.
- template<typename T >
  void getPoints (std::vector< T > &points)

  Returns all points of the Wall. Iterates over all Planes and pushes its Points into a vector.

5.23.1 Member Function Documentation

5.23.1.1 void Wall::addPlane (Plane & *pc*) [inline]

Adds a Plane to the Wall.

Parameters

pc	Plane

5.23.1.2 void Wall::addRoom (Room & *room*) [inline]

Adds Room to the Wall.

Parameters

room	Room

5.23.1.3 int Wall::getFloorId ( ) const [inline]

Returns Floor identifier.

Returns

Floor identifier

5.23.1.4 int Wall::getId ( ) const [inline]

Returns Wall identifier.

Returns

Wall identifier

5.23.1.5 std::vector<int>& Wall::getPlaneIDs ( ) [inline]

Returns Plane identifiers.

Returns

Plane identifiers

5.23.1.6 const std::vector<Plane>& Wall::getPlanes ( ) const [inline]

Returns all Planes.

Returns

Planes

5.23.1.7 std::vector<Plane>& Wall::getPlanes ( ) [inline]

Returns all Planes.

Returns

Planes

5.23.1.8 template<typename T > void Wall::getPoints (std::vector< T > & *points*) [inline]

Returns all points of the Wall. Iterates over all Planes and pushes its Points into a vector.

Template Parameters

T	Point type

Parameters

points	Points

5.23.1.9 std::vector<int>& Wall::getRoomIDs ( ) [inline]

Returns Room identifiers.

Returns

Room identifiers

5.23.1.10 const std::vector<Room>& Wall::getRooms ( ) const [inline]

Returns all Rooms.

Returns

Rooms

5.23.1.11 std::vector<Room>& Wall::getRooms ( ) [inline]

Returns all Rooms.

Returns

Rooms

5.23.1.12 bool Wall::isOuter ( ) const [inline]

Checks if wall is marked as outer.

Returns

True if wall is marked as outer, it probably has just a single plane
False if wall is marked as inner, it probably has 2 planes (or more)

5.23.1.13 void Wall::setFloorId (int *id*) [inline]

Sets Floor identifier.

Parameters

id	Floor identifier

5.23.1.14 void Wall::setId (int *id*) [inline]

Sets Wall identifier.

Parameters

id	Wall identifier

5.23.1.15 void Wall::setOuter (bool *outer*) [inline]

Changes outer flag.

Parameters

outer	Is wall outer?

5.23.1.16 void Wall::setPlaneIDs (std::vector< int > *pcl_ids*) [inline]

Sets Plane identifiers.

Parameters

pcl_ids	Plane identifiers

5.23.1.17 void Wall::setRoomIDs (std::vector< int > *pcl_ids*) [inline]

Sets Room identifiers.

Parameters

pcl_ids	Room identifiers

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

- /home/edita/spcl2/src/Wall.h

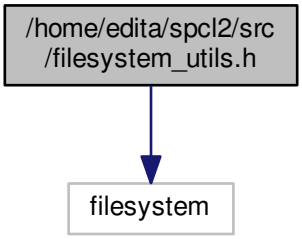
Chapter 6

File Documentation

6.1 /home/edita/spcl2/src/filesystem_utils.h File Reference

Set of functions supporting filesystem operations.

`#include <filesystem>`
Include dependency graph for filesystem_utils.h:



Functions

- bool directory_exists (const fs::path &p, fs::file_status s=fs::file_status{})
  Check if a given directory path exists.

6.1.1 Detailed Description

Set of functions supporting filesystem operations.

6.1.2 Function Documentation

6.1.2.1 bool directory_exists (const fs::path & *p*, fs::file_status *s* = `fs::file_status{}`)

Check if a given directory path exists.

Parameters

p	Path to directory
s	File status

Returns

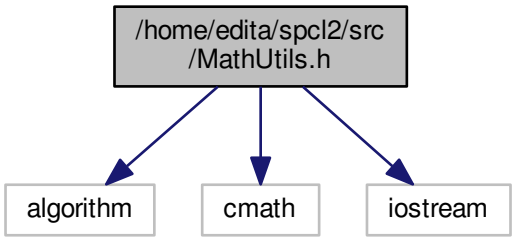
True if directory exists
False if diretory does not exist

6.2 /home/edita/spcl2/src/MathUtils.h File Reference

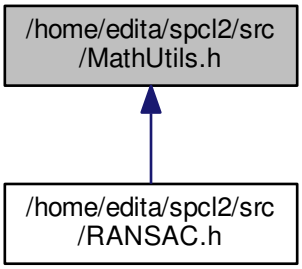
Set of functions supporting mathematic operations.

```
#include <algorithm>
#include <cmath>
#include <iostream>
#include "BoundingBox.h"
```

Include dependency graph for MathUtils.h:



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



Functions

- double det2 (double a1, double b1, double c1, double d1)

  Calculates the determinant of the given 2x2 matrix.
- double det3 (double matrix[3][3])

  Calculates the determinant of the given 3x3 matrix.
- void eig3 (double matrix[3][3], double lambda, double(&result)[3])

  Calculates eigenvector of the given 3x3 matrix for the given eigenvalue.
- void cubicEq (double au, double bu, double cu, double du, double(&result)[3])

  Calculates the solution of a cubic equation ($ax^3 + bx^2 + cx + d = 0$).
- template<typename T >
  void averageD (std::vector< T > &points, double(&v1)[3], double(&averageD))

  Calculates the average coefficient d for the plane ($ax + bx + cx + d = 0$) given by normal vector and interpolated through the given points.
- template<typename T >
  void planeFromPoints (std::vector< T > &points, std::vector< int > &indexes, double(&v1)[3], double &averageD)

  Interpolates the plane through the given points.
- template<typename T >
  void planeFromPoints (std::vector< T > &points, double(&v1)[3], double(&v2)[3], double(&v3)[3], double &averageD)

  Interpolates the plane through the given points.
- double angleBetweenPlanes (double a1, double b1, double c1, double a2, double b2, double c2)

  Calculates the angle between two planes ($ax + bx + cx + d = 0$).
- double angleBetweenPlanes (double n1[3], double n2[3])

  Calculates the angle between two planes given by normal vectors.
- double dot (double ax, double ay, double az, double bx, double by, double bz)

  Calculates the dot product of two vectors.
- void cross (double(&a)[3], double(&b)[3], double(&result)[3])

  Calculates the cross product of two vectors.
- void normalize (double(&vec)[3])

  Normalizes the given vector.
- template<typename T >
  void rotatePointsToLocal (std::vector< T > &points, double(&locx)[3], double(&locy)[3])

  Rotates points in the local coordinate system (z = 0).
- template<typename T >
  void rotatePoint (T &pt, double(&v1)[3], double(&v2)[3], double(&v3)[3])

  Rotates point in the local coordinate system given by its base vectors.
- template<typename T >
  void rotatePoints (std::vector< T > &points, double(&v1)[3], double(&v2)[3], double(&v3)[3])

  Rotates points in the local coordinate system given by its base vectors.
- template<typename T >
  void moveCSorigin (std::vector< T > &points, T O)

  Recalculates the coordinates of the points when the new origin of the coordinate system is set.
- template<typename T >
  void moveBackCSorigin (std::vector< T > &points, T O)

  Recalculates the coordinates of the points when the origin of the coordinate system is reset from the given O to (0, 0, 0).
- template<typename T >
  void giveLocalCS (std::vector< T > &points, double(&locx)[3], double(&locy)[3], double(&locz)[3])

  Calculates local coordinate system of the plane defined by the given points.
- void giveLtoGVectorsFromLocalCS (double(&locx)[3], double(&locy)[3], double(&locz)[3], double(&l2g1)[3], double(&l2g2)[3], double(&l2g3)[3])

Calculates the global-to-local (G2L) transformation vectors to local-to-global (L2G) transformation vectors.

- template<typename T >
  double giveAverageCoord (std::vector< T > &points, int clndex)

  Calculates the average coordinate of the given points.
- template<typename T >
  void projectPointsToXYPlane (std::vector< T > &points)

  Sets the z-coordinate of the given points to the zero.

6.2.1 Detailed Description

Set of functions supporting mathematic operations.

6.2.2 Function Documentation

6.2.2.1 double angleBetweenPlanes (double *a1*, double *b1*, double *c1*, double *a2*, double *b2*, double *c2*)

Calculates the angle between two planes ($ax + bx + cx + d = 0$).

Parameters

a1	Coefficient a of the first plane
b1	Coefficient b of the first plane
c1	Coefficient c of the first plane
a1	Coefficient a of the second plane
b1	Coefficient b of the second plane
c1	Coefficient c of the second plane

Returns

Angle between the planes

6.2.2.2 double angleBetweenPlanes (double *n1[3]*, double *n2[3]*)

Calculates the angle between two planes given by normal vectors.

Parameters

n1	Normal vector of the first plane
n2	Normal vector of the second plane

Returns

Angle between the planes

6.2.2.3 template<typename T > void averageD (std::vector< T > & *points*, double(&) *v1[3]*, double & *averageD*)

Calculates the average coefficient d for the plane ($ax + bx + cx + d = 0$) given by normal vector and interpolated through the given points.

Parameters

points	Plane points
v1	Plane normal vector
averageD	Return parameter storing the calculated coefficient

6.2.2.4 void cross (double(&) *a[3]*, double(&) *b[3]*, double(&) *result[3]*)

Calculates the cross product of two vectors.

Parameters

a	The first vector
b	The second vector
result	Return parameter storing the resulting cross product

6.2.2.5 void cubicEq (double *au*, double *bu*, double *cu*, double *du*, double(&) *result[3]*)

Calculates the solution of a cubic equation ($ax^3 + bx^2 + cx + d = 0$).

Parameters

au	Coefficient a
bu	Coefficient b
cu	Coefficient c
du	Coefficient d
result	Return parameter storing the calculated solution

6.2.2.6 double det2 (double *a1*, double *b1*, double *c1*, double *d1*)

Calculates the determinant of the given 2x2 matrix.

Parameters

a1	Matrix element (1,1)
b1	Matrix element (1,2)
c1	Matrix element (2,1)
d1	Matrix element (2,2)

Returns

Determinant

6.2.2.7 double det3 (double *matrix[3][3]*)

Calculates the determinant of the given 3x3 matrix.

Parameters

matrix	3x3 matrix

Returns

Determinant

6.2.2.8 double dot (double *ax,* double *ay,* double *az,* double *bx,* double *by,* double *bz*)

Calculates the dot product of two vectors.

Parameters

ax	X component of the first vector
ay	Y component of the first vector
az	Z component of the first vector
bx	X component of the second vector
by	Y component of the second vector
bz	Z component of the second vector

Returns

Resulting dot product

6.2.2.9 void eig3 (double *matrix[3][3],* double *lambda,* double(&) *result[3]*)

Calculates eigenvector of the given 3x3 matrix for the given eigenvalue.

Parameters

matrix	3x3 matrix
lambda	Eigenvalue
result	Return parameter storing the calculated eigenvector

6.2.2.10 template<typename T > double giveAverageCoord (std::vector< T > & *points,* int *cIndex*)

Calculates the average coordinate of the given points.

Parameters

points	The points for calculation of the average coordinate
index	Index specifying which coordinate to calculate (0∼x, 1∼y, 2∼z)

Returns

The average coordinate calculated

6.2.2.11 template<typename T > void giveLocalCS (std::vector< T > & *points,* double(&) *locx[3],* double(&) *locy[3],* double(&) *locz[3]*)

Calculates local coordinate system of the plane defined by the given points.

Parameters

points	Points defining the plane for which to calculate the local coordinate system
locx	Return parameter storing local x-axis (in plane, horizontal)
locy	Return parameter storing local y-axis (in plane, vertical)
locz	Return parameter storing local z-axis (normal vector)

6.2.2.12 void giveLtoGVectorsFromLocalCS (double(&) *locx[3],* double(&) *locy[3],* double(&) *locz[3],* double(&) *l2g1[3],* double(&) *l2g2[3],* double(&) *l2g3[3]*)

Calculates the global-to-local (G2L) transformation vectors to local-to-global (L2G) transformation vectors.

Parameters

locx	The first G2L transformation vector
locy	The second G2L transformation vector
locz	The third G2L transformation vector
l2g1	In-out parameter storing the first L2G transformation vector $\{locx(1), locy(1), locz(1)\}$
l2g1	In-out parameter storing the second L2G transformation vector $\{locx(2), locy(2), locz(2)\}$
l2g1	In-out parameter storing the third L2G transformation vector $\{locx(3), locy(3), locz(3)\}$

6.2.2.13 template<typename T > void moveBackCSorigin (std::vector< T > & *points,* T *O*)

Recalculates the coordinates of the points when the origin of the coordinate system is reset from the given O to (0, 0, 0).

Parameters

pt	In-Out parameter storing the points to be transformed
O	Actual origin coordinates

6.2.2.14 template<typename T > void moveCSorigin (std::vector< T > & *points*, T *O*)

Recalculates the coordinates of the points when the new origin of the coordinate system is set.

Parameters

pt	In-Out parameter storing the points to be transformed
O	New origin coordinates

6.2.2.15 void normalize (double(&) *vec[3]*)

Normalizes the given vector.

Parameters

vec	In-Out parameter storing the vector to be normalized

6.2.2.16 template<typename T > void planeFromPoints (std::vector< T > & *points*, std::vector< int > & *indexes*, double(&) *v1[3]*, double & *averageD*)

Interpolates the plane through the given points.

Parameters

points	Points for the calculation
indexes	Indexes specifying which points to use for the plane calculation
v1	Return parametr storing the normal vector of the plane
averageD	Coefficient d of the plane equation ($ax + bx + cx + d = 0$)

6.2.2.17 template<typename T > void planeFromPoints (std::vector< T > & *points*, double(&) *v1[3]*, double(&) *v2[3]*, double(&) *v3[3]*, double & *averageD*)

Interpolates the plane through the given points.

Parameters

points	Points through which to interpolate the plane
v1	Return parametr storing the normal vector of the plane
v2	Return parametr storing the first in-plane vector

Parameters

v3	Return parametr storing the second in-plane vector
averageD	Coefficient d of the plane equation ($ax + bx + cx + d = 0$)

6.2.2.18 template<typename T > void projectPointsToXYPlane (std::vector< T > & *points*)

Sets the z-coordinate of the given points to the zero.

Parameters

points	In-Out parameter storing the points to be projected

6.2.2.19 template<typename T > void rotatePoint (T & *pt,* double(&) *v1[3],* double(&) *v2[3],* double(&) *v3[3]*)

Rotates point in the local coordinate system given by its base vectors.

Parameters

pt	In-Out parameter storing the point to be rotated
v1	The first base vector of the local coordinate system
v2	The second base vector of the local coordinate system
v3	The third base vector of the local coordinate system

6.2.2.20 template<typename T > void rotatePoints (std::vector< T > & *points,* double(&) *v1[3],* double(&) *v2[3],* double(&) *v3[3]*)

Rotates points in the local coordinate system given by its base vectors.

Parameters

pt	In-Out parameter storing the points to be rotated
v1	The first base vector of the local coordinate system
v2	The second base vector of the local coordinate system
v3	The third base vector of the local coordinate system

6.2.2.21 template<typename T > void rotatePointsToLocal (std::vector< T > & *points,* double(&) *locx[3],* double(&) *locy[3]*)

Rotates points in the local coordinate system (z = 0).

Parameters

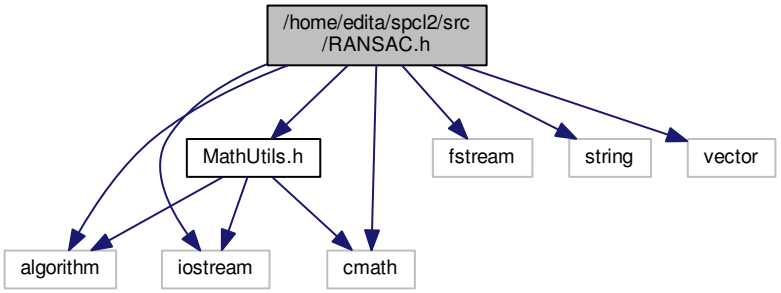
points	In-Out parameter storing the points to be rotated
locx	Local x vector
locy	Local y vector

6.3 /home/edita/spcl2/src/RANSAC.h File Reference

Set of functions suporting RANSAC algorithm.

```
#include <algorithm>
#include <iostream>
#include <fstream>
#include <string>
#include <vector>
#include <cmath>
#include "Point.h"
#include "MathUtils.h"
```

Include dependency graph for RANSAC.h:



Functions

- void plane_parameters (double(&point_coord)[3][3], double(&plane)[4])

  Calculates Plane coefficients from 3 points.
- template<typename T >
  void random_three_pnt (std::vector< T > &data, double(&ThreePoint)[3][3], double thres)

  Select 3 random points from the point list which are likely to form vertical plane.
- template<typename T >
  void findPlanes (std::vector< T > &dataset, std::vector< std::vector< T >> &output)

  Find vertical planes in a given point cloud.

6.3.1 Detailed Description

Set of functions suporting RANSAC algorithm.

6.3.2 Function Documentation

6.3.2.1 template<typename T > void findPlanes (std::vector< T > & *dataset*, std::vector< std::vector< T >> & *output*)

Find vertical planes in a given point cloud.

Template Parameters

T	Point type

Parameters

dataset	Points for plane finding
output	Vector of vectors containing each plane's points

6.3.2.2 void plane_parameters (double(&) *point_coord[3][3],* double(&) *plane[4]*)

Calculates Plane coefficients from 3 points.

Parameters

point_coord	2D Array of 3 points 3D coordinates
plane	Array of 4 plane coefficients

6.3.2.3 template<typename T > void random_three_pnt (std::vector< T > & *data,* double(&) *ThreePoint[3][3],* double *thres*)

Select 3 random points from the point list which are likely to form vertical plane.

Template Parameters

T	Point type

Parameters

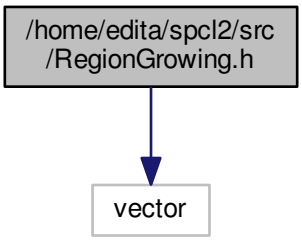
data	Points to select from
ThreePoint	2D Array of 3D Point coordinates
thres	Minimal distance for point selection

6.4 /home/edita/spcl2/src/RegionGrowing.h File Reference

Set of functions for region growing.

```
#include <vector>
#include "BitGrid.h"
```

Include dependency graph for RegionGrowing.h:



Functions

- bool getTrials (BitGrid &g, std::vector< int > &trials, int index)

  Calculates BitGrid cell indexes one cell around the given cell.
- bool getTrials2 (BitGrid &g, std::vector< int > &trials, int index)

  Calculates BitGrid cell indexes two cells around the given cell.
- bool grow (BitGrid &g, std::vector< int > &room, int index)

  Adds the cell index to the vector if the cell is active and deactivates the cell.
- void regionGrowing (BitGrid &g, std::vector< BitGrid > &segList, double minArea, int cellStep=1)

  Search for the active segments with minimal area in the given grid.
- void regionGrowingAround (BitGrid &g, std::vector< std::vector< int >> trialsVec, std::vector< BitGrid > &segList)

  Search for the region of active cells in the given grid around cells given by the trial vectors.
- bool inverseGrow (BitGrid &g, std::vector< int > &segment, int index)

  Adds the cell index to the vector if the cell is inactive and activates the cell.
- void inverseRegionGrowing (BitGrid &initialGrid, std::vector< BitGrid > &segList, std::vector< BitGrid > &boundaries, double minArea)

  Search for the inactive segments with minimal area in the given grid.
- std::vector< bool > boundaryGrowing2 (BitGrid &intermedPts, std::vector< BitGrid > &boundaries, std↩ ::vector< std::vector< int >> &indexes, std::vector< double > minIntermedPts)

  Search for the active cells in the grid around (+-1 cell) given boundaries segments with minimal area in the given grid and evaluates if the minimal number of cells is found.
- std::vector< bool > **boundaryGrowing** (BitGrid &intermedPts, std::vector< BitGrid > &boundaries, std↩ ::vector< std::vector< int >> &indexes, double minIntermedPts)

6.4.1 Detailed Description

Set of functions for region growing.

6.4.2 Function Documentation

6.4.2.1 std::vector<bool> boundaryGrowing2 (BitGrid & *intermedPts,* std::vector< BitGrid > & *boundaries,* std::vector< std::vector< int >> & *indexes,* std::vector< double > *minIntermedPts*)

Search for the active cells in the grid around (+-1 cell) given boundaries segments with minimal area in the given grid and evaluates if the minimal number of cells is found.

Parameters

intermedPts	BitGrid in which to search for the active cells
boundaries	Vector of the boundaries around which to search for the active cells
indexes	Return parameter storing the indexes of the bands found
minIntermedPts	Minimal ratio of the boundary cells over the found active cells

Returns

True if sufficient number of active cells is found
False if insufficient number of active cells is found

6.4.2.2 bool getTrials (BitGrid & *g*, std::vector< int > & *trials*, int *index*)

Calculates BitGrid cell indexes one cell around the given cell.

Parameters

g	BitGrid for which to calculate the indexes
trials	Return parameter storing the calculated indexes
index	Index of the cell around which to search for the neighbours

Returns

True if neighbouring indexes are calculated
False for invalid initial index

6.4.2.3 bool getTrials2 (BitGrid & *g*, std::vector< int > & *trials*, int *index*)

Calculates BitGrid cell indexes two cells around the given cell.

Parameters

g	BitGrid for which to calculate the indexes
trials	Return parameter storing the calculated indexes
index	Index of the cell around which to search for the neighbours

Returns

True if neighbouring indexes are calculated
False for invalid initial index

6.4.2.4 bool grow (BitGrid & *g*, std::vector< int > & *room*, int *index*)

Adds the cell index to the vector if the cell is active and deactivates the cell.

Parameters

g	BitGrid in which to evaluate the cell index
room	In-Out parameter where the index is added if the cell is active
index	Index of the cell to be evaluated

Returns

True if index is added and the cell is deactivated in the initial grid
False for invalid initial index or inactive cell; no index added

6.4.2.5 bool inverseGrow (BitGrid & *g*, std::vector< int > & *segment*, int *index*)

Adds the cell index to the vector if the cell is inactive and activates the cell.

Parameters

g	BitGrid in which to evaluate the cell index
room	In-Out parameter where the index is added if the cell is inactive
index	Index of the cell to be evaluated

Returns

True if index is added and the cell is activated in the initial grid
False for invalid initial index or active cell; no index added

6.4.2.6 void inverseRegionGrowing (BitGrid & *initialGrid*, std::vector< BitGrid > & *segList*, std::vector< BitGrid > & *boundaries*, double *minArea*)

Search for the inactive segments with minimal area in the given grid.

Parameters

g	BitGrid in which to search for the segments
segList	Return parameter storing the segments found
boundaries	Return parameter storing the neighbouring cells of the segments found
minArea	Minimal area of the calculated segment

6.4.2.7 void regionGrowing (BitGrid & *g*, std::vector< BitGrid > & *segList*, double *minArea*, int *cellStep* = 1)

Search for the active segments with minimal area in the given grid.

Parameters

g	BitGrid in which to search for the segments
segList	Return parameter storing the segments found

Parameters

minArea	Minimal area of the calculated segment
cellStep	Specifies how many cells around to search for the active cells (default = 1)

6.4.2.8 void regionGrowingAround (BitGrid & *g*, std::vector< std::vector< int >> *trialsVec*, std::vector< BitGrid > & *segList*)

Search for the region of active cells in the given grid around cells given by the trial vectors.

Parameters

g	BitGrid in which to search for the region
trialsVec	Vector of the vectors of the indexes around (+-1 cell) which to search for the region
segList	Return parameter storing the segments found

Index