

QRodSystems

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# Chapter 1

## Hierarchical Index

### 1.1 Class Hierarchy

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# Class Index

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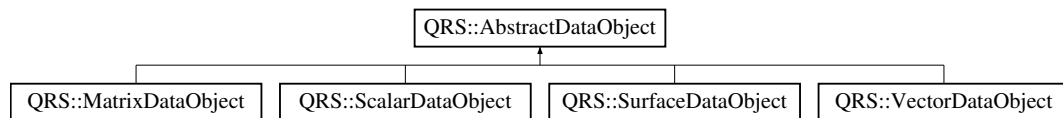
# Class Documentation

### 4.1 QRS::AbstractDataObject Class Reference

Data object which is designed in the way to be represented in a table easily.

```
#include <abstractdataobject.h>
```

Inheritance diagram for QRS::AbstractDataObject:



#### Public Member Functions

- [AbstractDataObject](#) (DataObjectType type, QString const &name)  
*Base constructor.*
- virtual [AbstractDataObject](#) \* **clone** () const =0
- virtual [DataItem](#) & **addItem** (DataKeyType key)=0
- void [removeItem](#) (DataValueType key)  
*Remove an entity with the specified key.*
- bool [changeItemKey](#) (DataKeyType oldKey, DataKeyType newKey, DataHolder \*items=nullptr)  
*Modify a key existed.*
- DataValueType [getAvailableItemKey](#) (DataValueType key, DataHolder const \*items=nullptr) const
- bool [setArrayValue](#) (DataKeyType key, DataValueType newValue, uint iRow=0, uint iColumn=0)  
*Set an array value with the specified indices.*
- DataHolder & **getItems** ()
- [DataItem](#) & **getItem** (DataValueType keyParameter)
- DataIDType **id** () const
- DataObjectType **type** () const
- QString const & **name** () const
- void **setName** (QString const &name)
- virtual void [serialize](#) (QDataStream &stream) const  
*Serialize an abstract data object.*
- virtual void [deserialize](#) (QDataStream &stream)  
*Partly deserialize an abstract data object.*

## Static Public Member Functions

- static uint **numberOfObjects** ()
- static void **setNumberOfObjects** (uint numObjects)

## Protected Attributes

- const DataObjectType **mType**  
*Object type.*
- QString **mName**  
*Name of an object.*
- DataIDType **mID**  
*Unique object identificator.*
- DataHolder **mItems**  
*Map contains all created entities.*

## Static Private Attributes

- static uint **smNumObjects** = 0  
*Number of all objects created.*

## Friends

- QDataStream & **operator<<** (QDataStream &stream, [AbstractDataObject](#) const &obj)  
*Print a data object to a stream.*
- QDataStream & **operator>>** (QDataStream &stream, [AbstractDataObject](#) &obj)  
*Read a data object from a stream.*

### 4.1.1 Detailed Description

Data object which is designed in the way to be represented in a table easily.

### 4.1.2 Member Function Documentation

#### 4.1.2.1 deserialize()

```
void AbstractDataObject::deserialize (
    QDataStream & stream ) [virtual]
```

Partly deserialize an abstract data object.

It is assumed that a type and name have already been assigned. So, only an identifier and items need to be set.

Reimplemented in [QRS::SurfaceDataObject](#).

## 4.1.2.2 getAvailableItemKey()

```
DataValueType AbstractDataObject::getAvailableItemKey (
    DataValueType key,
    DataHolder const * items = nullptr ) const
```

Check if a given key is unique

## Returns

Returns the input value of the key if it is unique, otherwise – a first available key

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

- /home/qinterfly/Library/Projects/QRodSystems/src/core/[abstractdataobject.h](#)
- /home/qinterfly/Library/Projects/QRodSystems/src/core/[abstractdataobject.cpp](#)

## 4.2 QRS::Array&lt; T &gt; Class Template Reference

Numerical array class.

```
#include <array.h>
```

## Classes

- struct [Row](#)  
*Proxy class to acquire a row by index.*

## Public Member Functions

- **Array** (IndexType numRows=0, IndexType numCols=0)
- [Array](#) ([Array](#)< T > const &another)  
*Copy constructor.*
- [Array](#) ([Array](#)< T > &&another)  
*Move constructor.*
- T \* **data** ()
- void [resize](#) (IndexType numRows, IndexType numCols)  
*Resize and copy previous values if possible.*
- void [removeColumn](#) (IndexType iRemoveColumn)  
*Remove a column by index.*
- void [swapColumns](#) (IndexType iFirstColumn, IndexType iSecondColumn)  
*Swap two columns.*
- IndexType **rows** () const
- IndexType **cols** () const
- IndexType **size** () const
- [Row](#)< T > **operator[]** (IndexType iRow)

## Private Attributes

- IndexType `mNumRows`  
*Number of rows.*
- IndexType `mNumCols`  
*Number of columns.*
- T \* `mpData` = nullptr  
*Pointer to the data stored.*

## Friends

- template<typename K >  
QDebug `operator<<` (QDebug stream, `Array< K > &array`)  
*Print all array values using the matrix format.*
- template<typename K >  
QDataStream & `operator<<` (QDataStream &stream, `Array< K > const &array`)  
*Write an array to a stream.*
- template<typename K >  
QDataStream & `operator>>` (QDataStream &stream, `Array< K > &array`)  
*Read an array from a stream.*

### 4.2.1 Detailed Description

```
template<typename T>
class QRS::Array< T >
```

Numerical array class.

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

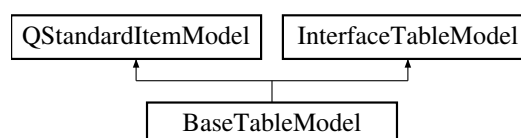
- /home/qinterfly/Library/Projects/QRodSystems/src/core/array.h
- /home/qinterfly/Library/Projects/QRodSystems/src/core/array.cpp

## 4.3 BaseTableModel Class Reference

Table model to represent either a scalar or vector data object.

```
#include <basetablemodel.h>
```

Inheritance diagram for BaseTableModel:





## Public Member Functions

- **BaseTableModel** (QWidget \*parent=nullptr)
- void **setDataObject** ([QRS::AbstractDataObject](#) \*pDataObject)  
*Set a data object to represent.*
- bool **setData** (const QModelIndex &indexEdit, const QVariant &value, int role=Qt::EditRole) override  
*Set the data acquired from a delegate.*
- void **insertItemAfterSelected** (QItemSelectionModel \*selectionModel) override  
*Insert a new item after selected one.*
- void **insertLeadingItemAfterSelected** (QItemSelectionModel \*) override
- void **removeSelectedItem** (QItemSelectionModel \*selectionModel) override  
*Remove an array under selection.*
- void **removeSelectedLeadingItem** (QItemSelectionModel \*) override

## Private Member Functions

- void **updateContent** ()  
*Represent all items which a data object contains.*
- void **clearContent** ()  
*Clear previously created items.*

## Private Attributes

- [QRS::AbstractDataObject](#) \* **mpDataObject** = nullptr

## Additional Inherited Members

### 4.3.1 Detailed Description

Table model to represent either a scalar or vector data object.

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

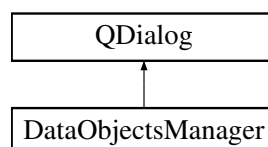
- /home/qinterfly/Library/Projects/QRodSystems/src/managers/[basetablemodel.h](#)
- /home/qinterfly/Library/Projects/QRodSystems/src/managers/[basetablemodel.cpp](#)

## 4.4 DataObjectsManager Class Reference

Manager to create objects of different types: scalars, vectors, matroces and surfaces.

```
#include <dataobjectsmanager.h>
```

Inheritance diagram for DataObjectsManager:



## Public Slots

- void [apply](#) ()  
*Apply all the changes made by user.*
- void [addScalar](#) ()  
*Add a scalar object.*
- void [addVector](#) ()  
*Add a vector object.*
- void [addMatrix](#) ()  
*Add a matrix object.*
- void [addSurface](#) ()  
*Add a surface object.*
- void [insertItemAfterSelected](#) ()  
*Insert a new array into the data object.*
- void [insertLeadingItemAfterSelected](#) ()  
*Insert a new leading item into the data object.*
- void [removeSelectedItem](#) ()  
*Remove a selected item.*
- void [removeSelectedLeadingItem](#) ()  
*Remove a selected leading item.*
- void [removeSelectedDataObject](#) ()  
*Remove a selected data object.*

## Public Member Functions

- **DataObjectsManager** ([QRS::Project](#) &project, QSettings &settings, QWidget \*parent=nullptr)
- void [closeEvent](#) (QCloseEvent \*event) override  
*Save settings and delete handling widgets before closing the window.*
- void [selectDataObject](#) (int index)  
*Select a data object from the list.*
- mapDataObjects const & **getDataObjects** ()

## Private Types

- using **mapDataObjects** = std::unordered\_map< QRS::DataIDType, [QRS::AbstractDataObject](#) \* >

## Private Slots

- void [representSelectedDataObject](#) ()  
*Represent a selected data object according to its type.*
- void [renameDataObject](#) (QListWidgetItem \*item)  
*Rename a data object.*

## Private Member Functions

- void [createContent](#) ()  
*Create all the widgets.*
- ads::CDockWidget \* [createDataTableWidget](#) ()  
*Create a tabbed widget to interact with data tables.*
- ads::CDockWidget \* [createDataObjectsWidget](#) ()  
*Create an object to present all data objects.*
- ads::CDockWidget \* [createCodeWidget](#) ()  
*Create a widget enables to code data objects.*
- QLayout \* [createDialogControls](#) ()  
*Create dialog controls.*
- void [retrieveDataObjects](#) ()  
*Make a copy of existed data objects.*
- void [restoreSettings](#) ()  
*Restore settings from a file.*
- void [saveSettings](#) ()  
*Save settings to a file.*
- void [emplaceDataObject](#) (QRS::AbstractDataObject \*dataObject)  
*Helper function to insert data objects into the manager.*
- void [addListDataObjects](#) (QRS::AbstractDataObject \*dataObject)  
*Add a data object to the list.*
- bool [isDataTableModifiable](#) ()  
*Helper function to check if it is possible to interact with data object content.*

## Private Attributes

- Ui::DataObjectsManager \* **mpUi**
- ads::CDockManager \* **mpDockManager**
- QListWidget \* **mpListDataObjects**
- QTreeView \* **mpDataTable**
- [QRS::Project](#) & **mProject**
- QSettings & **mSettings**
- QMapDataObjects **mDataObjects**
- [InterfaceTableModel](#) \* **mpInterfaceTableModel** = nullptr
- [BaseTableModel](#) \* **mpBaseTableModel**
- [MatrixTableModel](#) \* **mpMatrixTableModel**
- [SurfaceTableModel](#) \* **mpSurfaceTableModel**

### 4.4.1 Detailed Description

Manager to create objects of different types: scalars, vectors, matroces and surfaces.

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

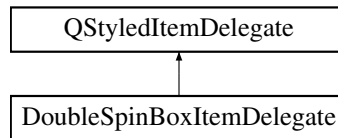
- </home/qinterfly/Library/Projects/QRodSystems/src/managers/dataobjectsmanager.h>
- </home/qinterfly/Library/Projects/QRodSystems/src/managers/dataobjectsmanager.cpp>

## 4.5 DoubleSpinBoxItemDelegate Class Reference

Class to set how table values can be edited.

```
#include <doublespinboxitemdelegate.h>
```

Inheritance diagram for DoubleSpinBoxItemDelegate:



### Public Member Functions

- **DoubleSpinBoxItemDelegate** (QObject \*parent=nullptr)
- QWidget \* [createEditor](#) (QWidget \*parent, const QStyleOptionViewItem &option, const QModelIndex &index) const override  
*Create a double value editor.*
- void [setEditorData](#) (QWidget \*editor, const QModelIndex &index) const override  
*Specify data to show.*
- void [setModelData](#) (QWidget \*editor, QAbstractItemModel \*model, const QModelIndex &index) const override  
*Set data to a model.*
- void [updateEditorGeometry](#) (QWidget \*editor, const QStyleOptionViewItem &option, const QModelIndex &index) const override  
*Set a geometry to render.*

### 4.5.1 Detailed Description

Class to set how table values can be edited.

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

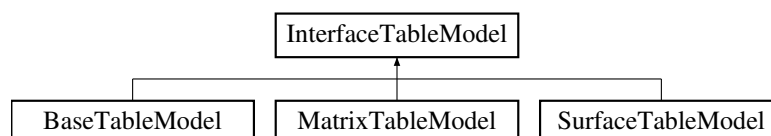
- /home/qinterfly/Library/Projects/QRodSystems/src/managers/[doublespinboxitemdelegate.h](#)
- /home/qinterfly/Library/Projects/QRodSystems/src/managers/[doublespinboxitemdelegate.cpp](#)

## 4.6 InterfaceTableModel Class Reference

User interface to add and remove items.

```
#include <interfacetablemodel.h>
```

Inheritance diagram for InterfaceTableModel:



## Public Member Functions

- virtual void **insertItemAfterSelected** (QItemSelectionModel \*selectionModel)=0
- virtual void **insertLeadingItemAfterSelected** (QItemSelectionModel \*selectionModel)=0
- virtual void **removeSelectedItem** (QItemSelectionModel \*selectionModel)=0
- virtual void **removeSelectedLeadingItem** (QItemSelectionModel \*selectionModel)=0

## Static Public Member Functions

- static QStandardItem \* **makeDoubleItem** (double value)  
*Helper function to make an item which holds a double value.*
- static QList< QStandardItem \* > **prepareRow** (QRS::Array< double > &array, uint iRow)  
*Helper function to copy a row from an array.*
- static QList< QStandardItem \* > **prepareRow** (double const &key, QRS::Array< double > &array, uint iRow)  
*Helper function to copy a row from an array and associate it with an key.*
- static QList< QStandardItem \* > **prepareRow** (QString const &name, QRS::Array< double > &array, uint iRow)  
*Helper function to copy a row from an array and associate it with a name.*
- static QStandardItem \* **makeLabelItem** (QString const &name)  
*Helper function to create an item which holds a string and cannot be modified.*

### 4.6.1 Detailed Description

User interface to add and remove items.

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

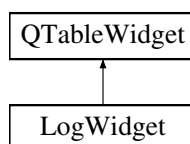
- /home/qinterfly/Library/Projects/QRodSystems/src/managers/[interfacetablemodel.h](#)
- /home/qinterfly/Library/Projects/QRodSystems/src/managers/[interfacetablemodel.cpp](#)

## 4.7 LogWidget Class Reference

Log all the messages sent.

```
#include <logwidget.h>
```

Inheritance diagram for LogWidget:



## Public Member Functions

- **LogWidget** (QWidget \*parent=nullptr)
- void **log** (QtMsgType messageType, const QString &message)  
*Represent a message sent.*

### 4.7.1 Detailed Description

Log all the messages sent.

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

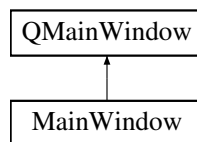
- </home/qinterfly/Library/Projects/QRodSystems/src/central/logwidget.h>
- </home/qinterfly/Library/Projects/QRodSystems/src/central/logwidget.cpp>

## 4.8 MainWindow Class Reference

The main window of the program.

```
#include <mainwindow.h>
```

Inheritance diagram for MainWindow:



### Public Member Functions

- **MainWindow** (QWidget \*parent=nullptr)

### Static Public Attributes

- static [LogWidget](#) \* **pLogger** = nullptr

### Private Slots

- void [createProject](#) ()  
*Create a project and substitute the current one with it.*
- void [openProject](#) ()  
*Open a project.*
- bool [saveProject](#) ()  
*Save the current project.*
- bool [saveProjectAs](#) ()  
*Save the current project under a new name.*
- void [saveSettings](#) ()  
*Save the current window settings.*
- void [restoreSettings](#) ()  
*Restore window settings from a file.*
- void [createDataObjectsManager](#) ()  
*Show a manager for designing data objects.*
- void [createRodPropertiesManager](#) ()  
*Show a manager to set rod properties based on the created data objects.*
- void [createRodConstructorManager](#) ()  
*Show a manager to create a rod with assigned data properties.*
- void [aboutProgram](#) ()  
*Show information about a program.*

## Private Member Functions

- void [initializeWindow](#) ()  
*Set a state and geometry of [MainWindow](#).*
- void [createContent](#) ()  
*Create all the widgets and corresponding actions.*
- void [closeEvent](#) (QCloseEvent \*event) override  
*Save project and settings before exit.*
- ads::CDockWidget \* [createProjectHierarchyWidget](#) ()  
*Create a widget to represent a project hierarchy.*
- ads::CDockWidget \* [createGLWidget](#) ()  
*Create an OpenGL widget to render rods.*
- ads::CDockWidget \* [createLogWidget](#) ()  
*Create a window for logging.*
- ads::CDockWidget \* [createPropertiesWidget](#) ()  
*Create a window to modify properties of selected objects.*
- void [setProjectTitle](#) ()  
*Show information a name of a project.*
- void [specifyMenuConnections](#) ()  
*Set signals and slots for menu actions.*
- void [saveProjectChangesDialog](#) ()  
*Save project changes.*
- bool [saveProjectHelper](#) (QString const &filePath)  
*Helper method to perform saving of the current project.*

## Private Attributes

- Ui::MainWindow \* **mpUi**
- ads::CDockManager \* **mpDockManager**
- QSharedPointer< QSettings > **mpSettings**
- [DataObjectsManager](#) \* **mpDataObjectsManager** = nullptr
- [QRS::Project](#) \* **mpProject**
- QString **mLastPath**

### 4.8.1 Detailed Description

The main window of the program.

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

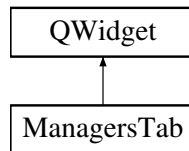
- [/home/qinterfly/Library/Projects/QRodSystems/src/central/mainwindow.h](#)
- [/home/qinterfly/Library/Projects/QRodSystems/src/central/mainwindow.cpp](#)

## 4.9 ManagersTab Class Reference

A toolbar consisted of object designers.

```
#include <controltabs.h>
```

Inheritance diagram for ManagersTab:



### Signals

- void **actionDataObjectsTriggered** ()
- void **actionRodPropertiesTriggered** ()
- void **actionRodConstructorTriggered** ()

### Public Member Functions

- [ManagersTab](#) (QWidget \*parent=nullptr)  
*Managers tab constructor.*

#### 4.9.1 Detailed Description

A toolbar consisted of object designers.

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

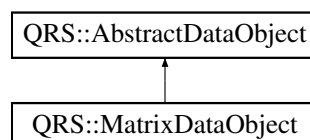
- /home/qinterfly/Library/Projects/QRodSystems/src/central/[controltabs.h](#)
- /home/qinterfly/Library/Projects/QRodSystems/src/central/[controltabs.cpp](#)

## 4.10 QRS::MatrixDataObject Class Reference

Matrix data object.

```
#include <matrixdataobject.h>
```

Inheritance diagram for QRS::MatrixDataObject:





## Public Member Functions

- [MatrixDataObject](#) (QString const &name)  
*Construct a matrix data object.*
- [AbstractDataObject](#) \* [clone](#) () const override  
*Clone a matrix data object.*
- [DataItem](#) & [addItem](#) (DataValueType key) override  
*Insert a new item into [MatrixDataObject](#).*

## Static Public Member Functions

- static uint **numberInstances** ()
- static void **setNumberInstances** (uint numInstances)

## Static Private Attributes

- static uint **smNumInstances** = 0

## Additional Inherited Members

### 4.10.1 Detailed Description

Matrix data object.

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

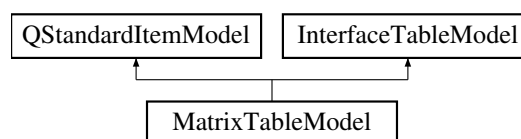
- /home/qinterfly/Library/Projects/QRodSystems/src/core/[matrixdataobject.h](#)
- /home/qinterfly/Library/Projects/QRodSystems/src/core/[matrixdataobject.cpp](#)

## 4.11 MatrixTableModel Class Reference

Table model to represent a matrix data object.

```
#include <matrixtablemodel.h>
```

Inheritance diagram for MatrixTableModel:



## Public Member Functions

- **MatrixTableModel** (QWidget \*parent=nullptr)
- void **setDataObject** (QRS::AbstractDataObject \*pDataObject)  
*Set a data object to represent.*
- bool **setData** (const QModelIndex &indexEdit, const QVariant &value, int role=Qt::EditRole) override  
*Set the data acquired from a delegate.*
- void **insertItemAfterSelected** (QItemSelectionModel \*selectionModel) override  
*Insert a new item after selected one.*
- void **insertLeadingItemAfterSelected** (QItemSelectionModel \*) override
- void **removeSelectedItem** (QItemSelectionModel \*selectionModel) override  
*Remove an array under selection.*
- void **removeSelectedLeadingItem** (QItemSelectionModel \*) override

## Private Member Functions

- void **updateContent** ()  
*Represent all items which a vector data object contains.*
- void **clearContent** ()  
*Clear previously created items.*

## Private Attributes

- QRS::AbstractDataObject \* **mpDataObject** = nullptr

## Additional Inherited Members

### 4.11.1 Detailed Description

Table model to represent a matrix data object.

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

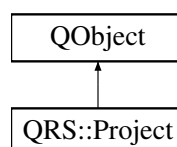
- /home/qinterfly/Library/Projects/QRodSystems/src/managers/matrixtablemodel.h
- /home/qinterfly/Library/Projects/QRodSystems/src/managers/matrixtablemodel.cpp

## 4.12 QRS::Project Class Reference

**Project** class to interact with a created system of rods.

```
#include <project.h>
```

Inheritance diagram for QRS::Project:



## Public Slots

- bool [save](#) (QString const &dir, QString const &fileName)  
*Save a project to a file.*

## Signals

- void **dataObjectAdded** (QRS::DataIDType id)
- void **dataObjectRemoved** (QRS::DataIDType id)
- void **allDataObjectsChanged** ()
- void **modified** (bool modifiedState)

## Public Member Functions

- [Project](#) (QString const &name)  
*Construct a clean project with the user specified name.*
- [Project](#) (QString const &path, QString const &fileName)  
*Read a project from a file.*
- bool **isModified** () const
- std::shared\_ptr< [AbstractDataObject](#) > [getDataObject](#) (DataIDType id)  
*Retrieve a data object by identifier.*
- std::unordered\_map< DataIDType, [AbstractDataObject](#) \* > [getDataObjects](#) ()  
*Copy data objects.*
- void [addDataObject](#) (DataObjectType type)  
*Create a data object with the specified type.*
- void [removeDataObject](#) (DataIDType id)  
*Remove a data object by id.*
- void [setDataObjects](#) (std::unordered\_map< DataIDType, [AbstractDataObject](#) \* > dataObjects)  
*Substitute current data objects with new ones.*
- QString const & **name** () const
- QString const & **filePath** () const

## Static Public Member Functions

- static QString const & **getFileExtension** ()

## Private Slots

- void [setModified](#) (bool modifiedState=true)  
*Set a modification state.*

## Private Attributes

- quint32 [mID](#)  
*Unique project identifier.*
- QString [mName](#)  
*Project name.*
- QString [mFilePath](#)  
*Path to a file where a project is stored.*
- bool [mIsModified](#) = true  
*Flag whether a project has been modified since last saving.*
- DataObjects [mDataObjects](#)  
*Data objects.*

## Static Private Attributes

- static const QString `skProjectExtension` = ".qrs"  
*File extensionn.*

### 4.12.1 Detailed Description

`Project` class to interact with a created system of rods.

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

- `/home/qinterfly/Library/Projects/QRodSystems/src/core/project.h`
- `/home/qinterfly/Library/Projects/QRodSystems/src/core/project.cpp`

## 4.13 QRS::Array< T >::Row< U > Struct Template Reference

Proxy class to acquire a row by index.

### Public Member Functions

- `Row` (`T *pData`)
- `T & operator[]` (`IndexType iCol`)

### Public Attributes

- `T * pRow`

### 4.13.1 Detailed Description

```
template<typename T>
template<typename U>
struct QRS::Array< T >::Row< U >
```

Proxy class to acquire a row by index.

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

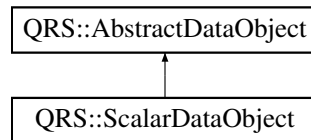
- `/home/qinterfly/Library/Projects/QRodSystems/src/core/array.h`

## 4.14 QRS::ScalarDataObject Class Reference

Scalar data object.

```
#include <scalardataobject.h>
```

Inheritance diagram for QRS::ScalarDataObject:



### Public Member Functions

- [ScalarDataObject](#) (QString const &name)  
*Construct a scalar data object.*
- [AbstractDataObject \\* clone](#) () const override  
*Clone a scalar data object.*
- [DataItemType](#) & [addItem](#) (DataValueType key) override  
*Insert a new item into [ScalarDataObject](#).*

### Static Public Member Functions

- static uint **numberInstances** ()
- static void **setNumberInstances** (uint numInstances)

### Static Private Attributes

- static uint **smNumInstances** = 0

### Additional Inherited Members

#### 4.14.1 Detailed Description

Scalar data object.

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

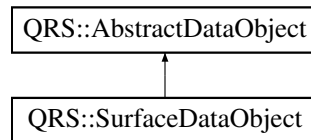
- /home/qinterfly/Library/Projects/QRodSystems/src/core/[scalardataobject.h](#)
- /home/qinterfly/Library/Projects/QRodSystems/src/core/[scalardataobject.cpp](#)

## 4.15 QRS::SurfaceDataObject Class Reference

Surface data object.

```
#include <surfacedataobject.h>
```

Inheritance diagram for QRS::SurfaceDataObject:



### Public Member Functions

- [SurfaceDataObject](#) (QString const &name)  
*Construct a surface data object.*
- [AbstractDataObject \\* clone](#) () const override  
*Clone a surface data object.*
- [DataItemType](#) & [addItem](#) (DataValueType key) override  
*Insert a new item into [SurfaceDataObject](#).*
- DataKeyType [addLeadingItem](#) (DataValueType key)  
*Add a leading item.*
- void [removeLeadingItem](#) (DataValueType key)  
*Remove a leading item.*
- bool [changeLeadingItemKey](#) (DataKeyType oldKey, DataKeyType newKey)  
*Modify a leading item key.*
- DataHolder & [getLeadingItems](#) ()
- void [serialize](#) (QDataStream &stream) const override  
*Serialize additional data of a surface object.*
- virtual void [deserialize](#) (QDataStream &stream) override  
*Deserialize additional data of a surface object.*

### Static Public Member Functions

- static uint [numberInstances](#) ()
- static void [setNumberInstances](#) (uint numInstances)

### Private Attributes

- DataHolder [mLeadingItems](#)

### Static Private Attributes

- static uint [smNumInstances](#) = 0

## Additional Inherited Members

### 4.15.1 Detailed Description

Surface data object.

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

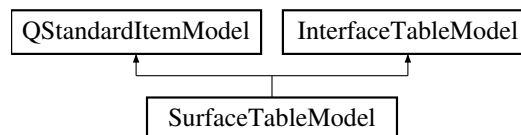
- /home/qinterfly/Library/Projects/QRodSystems/src/core/[surfacedataobject.h](#)
- /home/qinterfly/Library/Projects/QRodSystems/src/core/[surfacedataobject.cpp](#)

## 4.16 SurfaceTableModel Class Reference

Table model to represent a surface data object.

```
#include <surfacetablemodel.h>
```

Inheritance diagram for SurfaceTableModel:



## Public Member Functions

- **SurfaceTableModel** (QWidget \*parent=nullptr)
- void [setDataObject](#) (QRS::SurfaceDataObject \*pDataObject)  
*Set a surface data object to represent.*
- bool [setData](#) (const QModelIndex &indexEdit, const QVariant &value, int role=Qt::EditRole) override  
*Set the data acquired from a delegate.*
- void [insertItemAfterSelected](#) (QItemSelectionModel \*selectionModel) override  
*Insert a new item after selected one.*
- void [removeSelectedItem](#) (QItemSelectionModel \*selectionModel) override  
*Remove an array under selection.*
- void [insertLeadingItemAfterSelected](#) (QItemSelectionModel \*selectionModel) override  
*Add a new leading item after selected one.*
- void [removeSelectedLeadingItem](#) (QItemSelectionModel \*selectionModel) override  
*Remove a selected leading item.*

## Private Member Functions

- void [updateContent](#) ()  
*Represent all items which a data object contains.*
- void [clearContent](#) ()  
*Clear previously created items.*

## Private Attributes

- `QRS::SurfaceDataObject * mpDataObject = nullptr`

## Additional Inherited Members

### 4.16.1 Detailed Description

Table model to represent a surface data object.

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

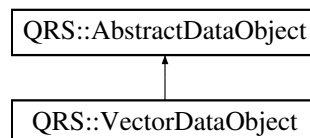
- `/home/qinterfly/Library/Projects/QRodSystems/src/managers/surfacetablemodel.h`
- `/home/qinterfly/Library/Projects/QRodSystems/src/managers/surfacetablemodel.cpp`

## 4.17 QRS::VectorDataObject Class Reference

Vector data object.

```
#include <vectordataobject.h>
```

Inheritance diagram for QRS::VectorDataObject:



## Public Member Functions

- `VectorDataObject` (QString const &name)  
*Construct a vector data object.*
- `AbstractDataObject * clone ()` const override  
*Clone a vector data object.*
- `DataItemType & addItem` (DataValueType key) override  
*Insert a new item into `VectorDataObject`.*

## Static Public Member Functions

- static uint `numberInstances` ()
- static void `setNumberInstances` (uint numInstances)

## Static Private Attributes

- static uint `smNumInstances` = 0



## Additional Inherited Members

### 4.17.1 Detailed Description

Vector data object.

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

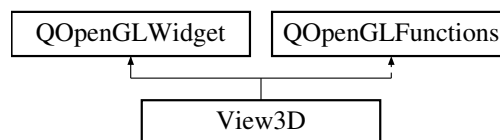
- [/home/qinterfly/Library/Projects/QRodSystems/src/core/vectordataobject.h](#)
- [/home/qinterfly/Library/Projects/QRodSystems/src/core/vectordataobject.cpp](#)

## 4.18 View3D Class Reference

A widget to represent the resulted rod system.

```
#include <view3d.h>
```

Inheritance diagram for View3D:



### Public Member Functions

- **View3D** (QWidget \*parent=nullptr)

### Protected Member Functions

- void [initializeGL](#) () override  
*Initialize a graphical scene.*
- void [paintGL](#) () override  
*Render its content.*

### Private Attributes

- bool **mCore**

### 4.18.1 Detailed Description

A widget to represent the resulted rod system.

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

- [/home/qinterfly/Library/Projects/QRodSystems/src/render/view3d.h](#)
- [/home/qinterfly/Library/Projects/QRodSystems/src/render/view3d.cpp](#)



## Chapter 5

# File Documentation

### 5.1 `/home/qinterfly/Library/Projects/QRod↔ Systems/src/central/controltabs.cpp` File Reference

Implementation of the ControlTabs class.

```
#include <QLayout>
#include <QToolBar>
#include <QIcon>
#include "controltabs.h"
```

#### 5.1.1 Detailed Description

Implementation of the ControlTabs class.

Author

Pavel Lakiza

Date

March 2021

### 5.2 `/home/qinterfly/Library/Projects/QRod↔ Systems/src/central/controltabs.h` File Reference

Declaration of the ControlTabs class.

```
#include <QWidget>
```

## Classes

- class [ManagersTab](#)

*A toolbar consisted of object designers.*

### 5.2.1 Detailed Description

Declaration of the ControlTabs class.

#### Author

Pavel Lakiza

#### Date

March 2021

## 5.3 [/home/qinterfly/Library/Projects/QRod↔](#) Systems/src/central/logwidget.cpp File Reference

Implementation of the [LogWidget](#) class.

```
#include <QHeaderView>
#include <QTime>
#include <QTimer>
#include "logwidget.h"
```

## Enumerations

- enum **ColumnType** { kTime , kType , kMessage }

### 5.3.1 Detailed Description

Implementation of the [LogWidget](#) class.

#### Author

Pavel Lakiza

#### Date

March 2021

## 5.4 /home/qinterfly/Library/Projects/QRodSystems/src/central/logwidget.h File Reference

Declaration of the [LogWidget](#) class.

```
#include <QTableWidget>
```

### Classes

- class [LogWidget](#)  
*Log all the messages sent.*

#### 5.4.1 Detailed Description

Declaration of the [LogWidget](#) class.

##### Author

Pavel Lakiza

##### Date

March 2021

## 5.5 /home/qinterfly/Library/Projects/QRodSystems/src/central/mainwindow.cpp File Reference

Implementation of the [MainWindow](#) class.

```
#include <QDesktopWidget>
#include <QToolBar>
#include <QTableWidget>
#include <QTreeView>
#include <QFileSystemModel>
#include <QTextEdit>
#include <QVBoxLayout>
#include <QSettings>
#include <QMessageBox>
#include <QFileDialog>
#include "DockManager.h"
#include "DockWidget.h"
#include "ads_globals.h"
#include "mainwindow.h"
#include "ui_mainwindow.h"
#include "controltabs.h"
#include "view3d.h"
#include "logwidget.h"
#include "../managers/dataobjectsmanager.h"
```

## Functions

- void [moveToCenter](#) (QWidget \*pWidget)

*Helper function to situate widgets at the center of their parent widgets.*

### 5.5.1 Detailed Description

Implementation of the [MainWindow](#) class.

Author

Pavel Lakiza

Date

March 2021

## 5.6 [/home/qinterfly/Library/Projects/QRod](#)↔ Systems/src/central/mainwindow.h File Reference

Declaration of the [MainWindow](#) class.

```
#include <QMainWindow>
#include "logwidget.h"
#include "../core/project.h"
```

## Classes

- class [MainWindow](#)

*The main window of the program.*

### 5.6.1 Detailed Description

Declaration of the [MainWindow](#) class.

Author

Pavel Lakiza

Date

March 2021

## 5.7 /home/qinterfly/Library/Projects/QRodSystems/src/core/abstractdataobject.cpp File Reference

Implementation of the AbstractDataObject class.

```
#include "abstractdataobject.h"
```

### 5.7.1 Detailed Description

Implementation of the AbstractDataObject class.

Author

Pavel Lakiza

Date

March 2021

## 5.8 /home/qinterfly/Library/Projects/QRodSystems/src/core/abstractdataobject.h File Reference

Declaration of the AbstractDataObject class.

```
#include <QString>
#include <QDataStream>
#include <unordered_map>
#include "array.h"
#include "datatypes.h"
```

### Classes

- class [QRS::AbstractDataObject](#)

*Data object which is designed in the way to be represented in a table easily.*

### Typedefs

- using **QRS::DataItemType** = Array< DataValueType >
- using **QRS::DataHolder** = std::map< DataKeyType, DataItemType >

### Functions

- QDataStream & [QRS::operator<<](#) (QDataStream &stream, AbstractDataObject const &obj)  
*Print a data object to a stream.*
- QDataStream & [QRS::operator>>](#) (QDataStream &stream, AbstractDataObject &obj)  
*Read a data object from a stream.*

### 5.8.1 Detailed Description

Declaration of the AbstractDataObject class.

Author

Pavel Lakiza

Date

March 2021

## 5.9 /home/qinterfly/Library/Projects/QRodSystems/src/core/array.cpp File Reference

Implementation of the Array class.

```
#include "array.h"
```

### 5.9.1 Detailed Description

Implementation of the Array class.

Author

Pavel Lakiza

Date

March 2021

## 5.10 /home/qinterfly/Library/Projects/QRodSystems/src/core/array.h File Reference

Declaration of the Array class.

```
#include <QDebug>
```

### Classes

- class [QRS::Array< T >](#)  
*Numerical array class.*
- struct [QRS::Array< T >::Row< U >](#)  
*Proxy class to acquire a row by index.*



## Typedefs

- using **QRS::IndexType** = unsigned int

## Functions

- template<typename K >  
QDebug **QRS::operator<<** (QDebug stream, Array< K > &array)  
*Print all array values using the matrix format.*
- template<typename K >  
QDataStream & **QRS::operator<<** (QDataStream &stream, Array< K > const &array)  
*Write an array to a stream.*
- template<typename K >  
QDataStream & **QRS::operator>>** (QDataStream &stream, Array< K > &array)  
*Read an array from a stream.*

### 5.10.1 Detailed Description

Declaration of the Array class.

Author

Pavel Lakiza

Date

March 2021

## 5.11 /home/qinterfly/Library/Projects/QRodSystems/src/core/datatypes.h File Reference

Specification of data types used in a project.

## Typedefs

- using **QRS::DataValueType** = double
- using **QRS::DataKeyType** = double
- using **QRS::DataIDType** = unsigned int

## Enumerations

- enum **DataObjectType** { **kScalar** , **kVector** , **kMatrix** , **kSurface** }

### 5.11.1 Detailed Description

Specification of data types used in a project.

Author

Pavel Lakiza

Date

March 2021

## 5.12 [/home/qinterfly/Library/Projects/QRod](#) Systems/src/core/matrixdataobject.cpp File Reference

Implementation of the MatrixDataObject class.

```
#include "matrixdataobject.h"
```

### 5.12.1 Detailed Description

Implementation of the MatrixDataObject class.

Author

Pavel Lakiza

Date

March 2021

## 5.13 [/home/qinterfly/Library/Projects/QRod](#) Systems/src/core/matrixdataobject.h File Reference

Declaration of the MatrixDataObject class.

```
#include "abstractdataobject.h"
```

### Classes

- class [QRS::MatrixDataObject](#)  
*Matrix data object.*

### 5.13.1 Detailed Description

Declaration of the MatrixDataObject class.

Author

Pavel Lakiza

Date

March 2021

## 5.14 /home/qinterfly/Library/Projects/QRodSystems/src/core/project.cpp File Reference

Implementation of the [QRS::Project](#) class.

```
#include <QDebug>
#include <QRandomGenerator>
#include <QFileInfo>
#include <QDir>
#include <QDataStream>
#include <QDateTime>
#include "project.h"
#include "scalardataobject.h"
#include "vectordataobject.h"
#include "matrixdataobject.h"
#include "surfacedataobject.h"
```

### Functions

- [AbstractDataObject](#) \* [createDataObject](#) (DataObjectType type, QString const &name)  
*Helper function to create DataObject instance by a type and name.*

### 5.14.1 Detailed Description

Implementation of the [QRS::Project](#) class.

Author

Pavel Lakiza

Date

March 2021

## 5.15 /home/qinterfly/Library/Projects/QRodSystems/src/core/project.h File Reference

Declaration of the [QRS::Project](#) class.

```
#include <QObject>
#include <unordered_map>
#include <memory>
#include "abstractdataobject.h"
#include "array.h"
```

### Classes

- class [QRS::Project](#)  
*Project class to interact with a created system of rods.*

### Typedefs

- using **QRS::DataObjects** = std::unordered\_map< DataIDType, std::shared\_ptr< AbstractDataObject > >

#### 5.15.1 Detailed Description

Declaration of the [QRS::Project](#) class.

Author

Pavel Lakiza

Date

March 2021

## 5.16 /home/qinterfly/Library/Projects/QRodSystems/src/core/scalardataobject.cpp File Reference

Implementation of the ScalarDataObject class.

```
#include "scalardataobject.h"
```

#### 5.16.1 Detailed Description

Implementation of the ScalarDataObject class.

Author

Pavel Lakiza

Date

March 2021

## 5.17 /home/qinterfly/Library/Projects/QRod↵ Systems/src/core/scalardataobject.h File Reference

Declaration of the ScalarDataObject class.

```
#include "abstractdataobject.h"
```

### Classes

- class [QRS::ScalarDataObject](#)  
*Scalar data object.*

#### 5.17.1 Detailed Description

Declaration of the ScalarDataObject class.

Author

Pavel Lakiza

Date

March 2021

## 5.18 /home/qinterfly/Library/Projects/QRod↵ Systems/src/core/surfacedataobject.cpp File Reference

Implementation of the SurfaceDataObject class.

```
#include "surfacedataobject.h"
```

#### 5.18.1 Detailed Description

Implementation of the SurfaceDataObject class.

Author

Pavel Lakiza

Date

March 2021

## 5.19 [/home/qinterfly/Library/Projects/QRod](#) Systems/src/core/surfacedataobject.h File Reference

Declaration of the SurfaceDataObject class.

```
#include "abstractdataobject.h"
```

### Classes

- class [QRS::SurfaceDataObject](#)  
*Surface data object.*

#### 5.19.1 Detailed Description

Declaration of the SurfaceDataObject class.

##### Author

Pavel Lakiza

##### Date

March 2021

## 5.20 [/home/qinterfly/Library/Projects/QRod](#) Systems/src/core/vectordataobject.cpp File Reference

Implementation of the VectorDataObject class.

```
#include "vectordataobject.h"
```

#### 5.20.1 Detailed Description

Implementation of the VectorDataObject class.

##### Author

Pavel Lakiza

##### Date

March 2021

## 5.21 /home/qinterfly/Library/Projects/QRodSystems/src/core/vectordataobject.h File Reference

Declaration of the VectorDataObject class.

```
#include "abstractdataobject.h"
```

### Classes

- class [QRS::VectorDataObject](#)  
*Vector data object.*

#### 5.21.1 Detailed Description

Declaration of the VectorDataObject class.

##### Author

Pavel Lakiza

##### Date

March 2021

## 5.22 /home/qinterfly/Library/Projects/QRodSystems/src/main/main.cpp File Reference

The startup function.

```
#include <QApplication>  
#include "mainwindow.h"
```

### Functions

- void [throwMessage](#) (QtMsgType type, const QMessageLogContext &, const QString &message)  
*Log all the messages.*
- int [main](#) (int argc, char \*argv[])  
*Entry point.*

### 5.22.1 Detailed Description

The startup function.

#### Author

Pavel Lakiza

#### Date

March 2021

## 5.23 [/home/qinterfly/Library/Projects/QRod](#) Systems/src/managers/basetablemodel.cpp File Reference

Implementation of the [BaseTableModel](#) class.

```
#include <QTreeView>
#include "basetablemodel.h"
#include "abstractdataobject.h"
```

### 5.23.1 Detailed Description

Implementation of the [BaseTableModel](#) class.

#### Author

Pavel Lakiza

#### Date

March 2021

## 5.24 [/home/qinterfly/Library/Projects/QRod](#) Systems/src/managers/basetablemodel.h File Reference

Declaration of the [BaseTableModel](#) class.

```
#include <QStandardItemModel>
#include "interfacetablemodel.h"
```

### Classes

- class [BaseTableModel](#)  
*Table model to represent either a scalar or vector data object.*



### 5.24.1 Detailed Description

Declaration of the [BaseTableModel](#) class.

Author

Pavel Lakiza

Date

March 2021

## 5.25 /home/qinterfly/Library/Projects/QRodSystems/src/managers/dataobjectsmanager.cpp File Reference

Implementation of the [DataObjectsManager](#) class.

```
#include <QTreeView>
#include <QSettings>
#include <QHBoxLayout>
#include <QToolBar>
#include <QListWidget>
#include <QTextEdit>
#include <QPushButton>
#include <QSpacerItem>
#include <QMessageBox>
#include <QShortcut>
#include "DockManager.h"
#include "DockWidget.h"
#include "dataobjectsmanager.h"
#include "ui_dataobjectsmanager.h"
#include "../core/project.h"
#include "../core/scalardataobject.h"
#include "../core/vectordataobject.h"
#include "../core/matrixdataobject.h"
#include "../core/surfacedataobject.h"
#include "basetablemodel.h"
#include "matrixtablemodel.h"
#include "surfacetablemodel.h"
#include "doublespinboxitemdelegate.h"
```

### Functions

- void [setToolBarShortcutHints](#) (QToolBar \*pToolBar)  
*Helper function to add a shortcut hint to all actions which a toolbar contains.*
- QIcon [getDataObjectIcon](#) (DataObjectType type)  
*Helper function to assign appropriate data object icon.*

### 5.25.1 Detailed Description

Implementation of the [DataObjectsManager](#) class.

Author

Pavel Lakiza

Date

March 2021

## 5.26 [/home/qinterfly/Library/Projects/QRod](#) Systems/src/managers/dataobjectsmanager.h File Reference

Declaration of the [DataObjectsManager](#) class.

```
#include <QSignalMapper>
#include <QDialog>
#include <unordered_map>
#include "../core/datatypes.h"
```

### Classes

- class [DataObjectsManager](#)  
*Manager to create objects of different types: scalars, vectors, matroces and surfaces.*

### 5.26.1 Detailed Description

Declaration of the [DataObjectsManager](#) class.

Author

Pavel Lakiza

Date

March 2021

## 5.27 [/home/qinterfly/Library/Projects/QRod](#) Systems/src/managers/doublespinboxitemdelegate.cpp File Reference

Implementation of the [DoubleSpinBoxItemDelegate](#) class.

```
#include "doublespinboxitemdelegate.h"
#include <QDoubleSpinBox>
```

### 5.27.1 Detailed Description

Implementation of the [DoubleSpinBoxItemDelegate](#) class.

#### Author

Pavel Lakiza

#### Date

March 2021

## 5.28 /home/qinterfly/Library/Projects/QRod↵ Systems/src/managers/doublespinboxitemdelegate.h File Reference

Declaration of the [DoubleSpinBoxItemDelegate](#) class.

```
#include <QStyledItemDelegate>
```

### Classes

- class [DoubleSpinBoxItemDelegate](#)  
*Class to set how table values can be edited.*

### 5.28.1 Detailed Description

Declaration of the [DoubleSpinBoxItemDelegate](#) class.

#### Author

Pavel Lakiza

#### Date

March 2021

## 5.29 /home/qinterfly/Library/Projects/QRod↵ Systems/src/managers/interfacetablemodel.cpp File Reference

Implementation of static functions of [InterfaceTableModel](#).

```
#include <QStandardItem>  
#include "interfacetablemodel.h"  
#include "array.h"
```

### 5.29.1 Detailed Description

Implementation of static functions of [InterfaceTableModel](#).

#### Author

Pavel Lakiza

#### Date

March 2021

## 5.30 [/home/qinterfly/Library/Projects/QRod](#) Systems/src/managers/interfacetablemodel.h File Reference

Interface of a table model.

```
#include <QItemSelection>
```

### Classes

- class [InterfaceTableModel](#)  
*User interface to add and remove items.*

### 5.30.1 Detailed Description

Interface of a table model.

#### Author

Pavel Lakiza

#### Date

March 2021

## 5.31 [/home/qinterfly/Library/Projects/QRod](#) Systems/src/managers/matrixtablemodel.cpp File Reference

Implementation of the [MatrixTableModel](#) class.

```
#include <QTreeView>  
#include "matrixtablemodel.h"  
#include "abstractdataobject.h"
```

### 5.31.1 Detailed Description

Implementation of the [MatrixTableModel](#) class.

Author

Pavel Lakiza

Date

March 2021

## 5.32 /home/qinterfly/Library/Projects/QRod↵ Systems/src/managers/matrixtablemodel.h File Reference

Declaration of the [MatrixTableModel](#) class.

```
#include <QStandardItemModel>
#include "interfacetablemodel.h"
```

### Classes

- class [MatrixTableModel](#)  
*Table model to represent a matrix data object.*

### 5.32.1 Detailed Description

Declaration of the [MatrixTableModel](#) class.

Author

Pavel Lakiza

Date

March 2021

## 5.33 /home/qinterfly/Library/Projects/QRod↵ Systems/src/managers/surfacetablemodel.cpp File Reference

Implementation of the [SurfaceTableModel](#) class.

```
#include <QTreeView>
#include "surfacedataobject.h"
#include "surfacetablemodel.h"
```

### 5.33.1 Detailed Description

Implementation of the [SurfaceTableModel](#) class.

Author

Pavel Lakiza

Date

March 2021

## 5.34 [/home/qinterfly/Library/Projects/QRod↵](#) Systems/src/managers/surfacetablemodel.h File Reference

Declaration of the [SurfaceTableModel](#) class.

```
#include <QStandardItemModel>
#include "interfacetablemodel.h"
```

### Classes

- class [SurfaceTableModel](#)  
*Table model to represent a surface data object.*

### 5.34.1 Detailed Description

Declaration of the [SurfaceTableModel](#) class.

Author

Pavel Lakiza

Date

March 2021

## 5.35 [/home/qinterfly/Library/Projects/QRod↵](#) Systems/src/render/view3d.cpp File Reference

Implementation of the [View3D](#) class.

```
#include <QOpenGLContext>
#include <QOpenGLPaintDevice>
#include <QPainter>
#include "view3d.h"
```

### 5.35.1 Detailed Description

Implementation of the [View3D](#) class.

Author

Pavel Lakiza

Date

March 2021

## 5.36 /home/qinterfly/Library/Projects/QRodSystems/src/render/view3d.h File Reference

Declaration of the [View3D](#) class.

```
#include <QOpenGLWidget>
#include <QOpenGLFunctions>
```

### Classes

- class [View3D](#)

*A widget to represent the resulted rod system.*

### 5.36.1 Detailed Description

Declaration of the [View3D](#) class.

Author

Pavel Lakiza

Date

March 2021

