ICP Project 2023/2024

1.0

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Chapter 1

Namespace Index

1.1 Namespace List

Here is a list of all namespaces with brief descriptions:

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

Namespace Documentation

4.1 Ui Namespace Reference

Chapter 5

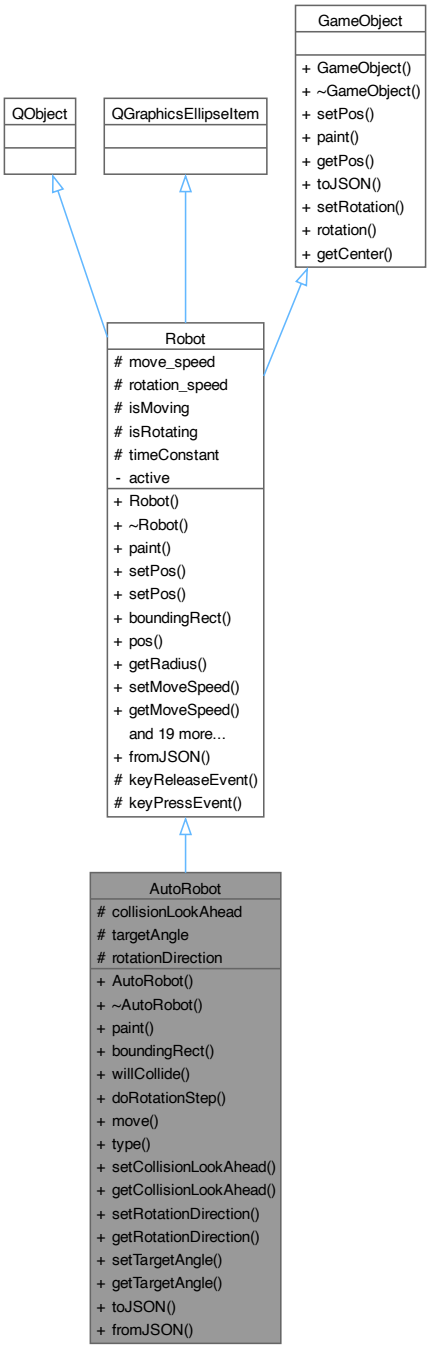
Class Documentation

5.1 AutoRobot Class Reference

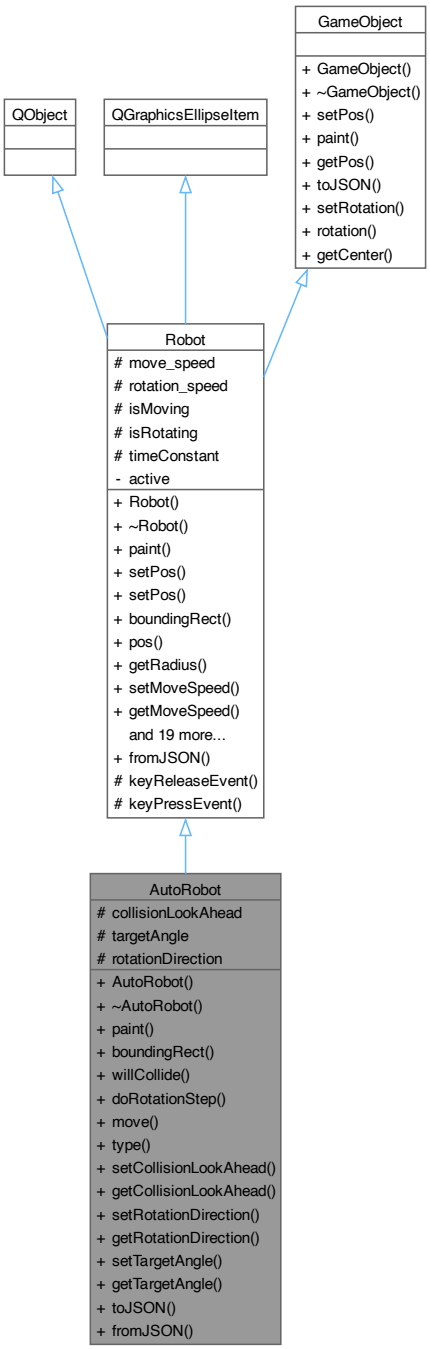
A class to represent an autonomous robot.

`#include <autorobot.hpp>`

Inheritance diagram for AutoRobot:



Collaboration diagram for AutoRobot:



Public Types

- enum { Type = QGraphicsItem::UserType + 2 }

Public Types inherited from Robot

- enum RotationDirection { Left = -1 , None = 0 , Right = 1 }

Enum to represent the direction of rotation of the robot.

- enum { Type = QGraphicsItem::UserType + 1 }

Public Member Functions

- AutoRobot (QGraphicsItem *parent=nullptr, qreal size=50, qreal collisionLookAhead=10, Robot::RotationDirection rotationDirection=Robot::RotationDirection::Right, qreal moveSpeed=1, qreal rotationSpeed=1, qreal *timeConstant=nullptr)

  Constructor for AutoRobot.
- ~AutoRobot ()
- void paint (QPainter *painter, const QStyleOptionGraphicsItem *option, QWidget *widget) override
- QRectF boundingRect () const override
- bool willCollide (QPointF directionVector, qreal magnitude, bool allowAnticollision) override

  Check if the robot will collide with any object in the scene.
- void doRotationStep (RotationDirection direction)

  Perform a rotation step.
- bool move () override

  Perform a movement step.
- int type () const override

  Get the type of the object.
- void setCollisionLookAhead (qreal lookAhead)

  Set the look ahead distance for collision detection.
- qreal getCollisionLookAhead ()

  Get the look ahead distance for collision detection.
- void setRotationDirection (RotationDirection direction)

  Set the rotation direction of the robot.
- RotationDirection getRotationDirection ()

  Get the rotation direction of the robot.
- void setTargetAngle (qreal angle)

  Set the target angle of the robot.
- qreal getTargetAngle ()

  Get the target angle of the robot.
- QJsonObject toJSON () override

  Get the JSON representation of the object.

Public Member Functions inherited from Robot

- Robot (QGraphicsItem *parent=nullptr, qreal *timeConstant=nullptr)

  Default constructor.
- ~Robot ()
- void setPos (const QPointF &pos)
- void setPos (qreal x, qreal y) override
- QPointF pos ()
- qreal getRadius () const
- void setMoveSpeed (qreal speed)

  Set the move speed of the robot.
- qreal getMoveSpeed ()

  Get the move speed of the robot.
- void setRotationSpeed (qreal speed)

  Set the rotation speed of the robot.

- qreal getRotationSpeed ()

  Get the rotation speed of the robot.
- void startMoving ()

  Allow the robot to be moved by setting the isMoving flag to true.
- void stopMoving ()

  Stop the robot from moving by setting the isMoving flag to false.
- void startRotating (RotationDirection direction)

  Start rotating the robot in the given direction.
- void stopRotating ()

  Stop the robot from rotating by setting the isRotating flag to None.
- QPointF getDirectionVector ()

  Get the direction vector of the robot.
- int type () const override

  Get the type of the robot.
- QPointF getPos () override

  Get the position of the robot.
- void toggleActive ()

  Toggle the active state of the robot.
- bool isActive ()

  Check if the robot is active.
- qreal getAngle ()

  Get the angle of the robot.
- void setRadius (qreal radius)

  Set the angle of the robot.
- QPointF getCenter () override

  Get the center of the robot.
- qreal rotation () override

  Get the time constant of the simulation.
- void setRotation (qreal angle) override

  Set the rotation of the robot.

Public Member Functions inherited from GameObject

- GameObject ()=default
- ~GameObject ()=default

Static Public Member Functions

- static AutoRobot * fromJSON (const QJsonObject &object, qreal *timeConstant)

  Create an AutoRobot object from a JSON object.

Static Public Member Functions inherited from Robot

- static Robot * fromJSON (const QJsonObject &object, qreal *timeConstant)

  Create a Robot object from a JSON object.

Protected Attributes

- qreal collisionLookAhead = 0

  The look ahead distance for collision detection.
- qreal targetAngle = 0

  The target angle of the robot.
- Robot::RotationDirection rotationDirection = Robot::RotationDirection::Right

  The rotation direction of the robot.

Protected Attributes inherited from Robot

- qreal move_speed = 1

  The speed of the robot.
- qreal rotation_speed = 1

  The speed of the rotation of the robot.
- bool isMoving = false

  Flag to indicate if the robot is moving.
- RotationDirection isRotating = RotationDirection::None

  Flag to indicate the direction of rotation.
- qreal * timeConstant = nullptr

  The time constant of the simulation.

Additional Inherited Members

Signals inherited from Robot

- void paramsUpdated ()

  Signal emitted when the parameters of the robot are updated.
- void robotSepuku ()

  Signal emitted when the robot is removed.

Protected Member Functions inherited from Robot

- void keyReleaseEvent (QKeyEvent *event)

  The radius of the robot.
- void keyPressEvent (QKeyEvent *event)

  Overridden keyPressEvent method.

5.1.1 Detailed Description

A class to represent an autonomous robot.

This class inherits from Robot and provides functionalities for an autonomous robot.

See also

Robot

5.1.2 Member Enumeration Documentation

5.1.2.1 anonymous enum

```
anonymous enum
```

Enumerator

Type	

5.1.3 Constructor & Destructor Documentation

5.1.3.1 AutoRobot()

```
AutoRobot::AutoRobot (
            QGraphicsItem * parent = nullptr,
            qreal size = 50,
            qreal collisionLookAhead = 10,
            Robot::RotationDirection rotationDirection = Robot::RotationDirection::Right,
            qreal moveSpeed = 1,
            qreal rotationSpeed = 1,
            qreal * timeConstant = nullptr )
```

Constructor for AutoRobot.

Parameters

parent	The parent QGraphicsItem.
size	The size of the robot.
collisionLookAhead	The distance the robot looks ahead for collisions.
rotationDirection	The initial rotation direction of the robot.
moveSpeed	The movement speed of the robot.
rotationSpeed	The rotation speed of the robot.
timeConstant	A pointer to the time constant.

5.1.3.2 ~AutoRobot()

```
AutoRobot::~AutoRobot ( )
```

5.1.4 Member Function Documentation

5.1.4.1 boundingRect()

```
QRectF AutoRobot::boundingRect ( ) const  [override], [virtual]
```

Reimplemented from Robot.

5.1.4.2 doRotationStep()

```
void AutoRobot::doRotationStep (
            RotationDirection direction )
```

Perform a rotation step.

Parameters

direction	The direction of the rotation

Returns

void

5.1.4.3 fromJSON()

```
static AutoRobot * AutoRobot::fromJSON (
            const QJsonObject & object,
            qreal * timeConstant )  [static]
```

Create an AutoRobot object from a JSON object.

Parameters

object	The JSON object to create the AutoRobot object from
timeConstant	The time constant of the robot

Returns

AutoRobot* The AutoRobot object created from the JSON object

5.1.4.4 getCollisionLookAhead()

```
qreal AutoRobot::getCollisionLookAhead ( )  [inline]
```

Get the look ahead distance for collision detection.

Returns

qreal The look ahead distance

5.1.4.5 getRotationDirection()

```
RotationDirection AutoRobot::getRotationDirection ( )  [inline]
```

Get the rotation direction of the robot.

Returns

RotationDirection The rotation direction

5.1.4.6 getTargetAngle()

```
qreal AutoRobot::getTargetAngle ( )  [inline]
```

Get the target angle of the robot.

Returns

qreal The target angle

5.1.4.7 move()

```
bool AutoRobot::move ( )  [override], [virtual]
```

Perform a movement step.

Returns

bool Whether the movement step was successful

Reimplemented from Robot.

5.1.4.8 paint()

```
void AutoRobot::paint (
            QPainter * painter,
            const QStyleOptionGraphicsItem * option,
            QWidget * widget )  [override], [virtual]
```

Override the paint method to draw a line showing the direction of the robot

Reimplemented from Robot.

5.1.4.9 setCollisionLookAhead()

```
void AutoRobot::setCollisionLookAhead (
            qreal lookAhead )  [inline]
```

Set the look ahead distance for collision detection.

Parameters

lookAhead	The look ahead distance

Returns

void

5.1.4.10 setRotationDirection()

```
void AutoRobot::setRotationDirection (
            RotationDirection direction )  [inline]
```

Set the rotation direction of the robot.

Parameters

direction	The rotation direction

Returns

void

5.1.4.11 setTargetAngle()

```
void AutoRobot::setTargetAngle (
            qreal angle )  [inline]
```

Set the target angle of the robot.

Parameters

angle	The target angle

Returns

void

5.1.4.12 toJSON()

```
QJsonObject AutoRobot::toJSON ( )  [override], [virtual]
```

Get the JSON representation of the object.

Returns

QJsonObject The JSON representation of the object

Reimplemented from Robot.

5.1.4.13 type()

```
int AutoRobot::type ( ) const  [inline], [override]
```

Get the type of the object.

Returns

int The type of the object

5.1.4.14 willCollide()

```
bool AutoRobot::willCollide (
            QPointF directionVector,
            qreal magnitude,
            bool allowAnticollision )  [override], [virtual]
```

Check if the robot will collide with any object in the scene.

Parameters

directionVector	The direction vector of the robot
magnitude	The magnitude of the direction vector
allowAnticollision	Whether to allow anticollision

Returns

bool Whether the robot will collide with any object in the scene

Reimplemented from Robot.

5.1.5 Member Data Documentation

5.1.5.1 collisionLookAhead

```
qreal AutoRobot::collisionLookAhead = 0  [protected]
```

The look ahead distance for collision detection.

5.1.5.2 rotationDirection

```
Robot::RotationDirection AutoRobot::rotationDirection = Robot::RotationDirection::Right  [protected]
```

The rotation direction of the robot.

5.1.5.3 targetAngle

```
qreal AutoRobot::targetAngle = 0  [protected]
```

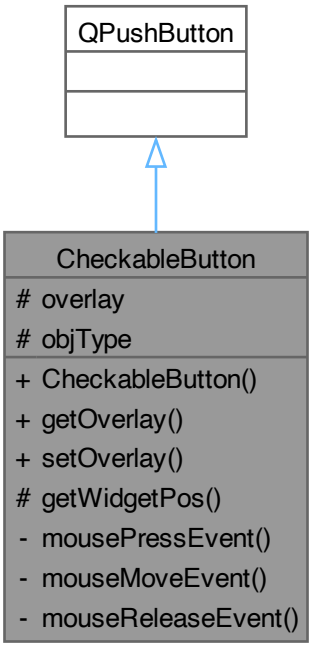
The target angle of the robot.

5.2 CheckableButton Class Reference

A class to represent a checkable button.

`#include <checkablebutton.hpp>`

Inheritance diagram for CheckableButton:



Collaboration diagram for CheckableButton:

Public Types

- enum ObjectType { AUTO , CONT , OBST }

  Enum to represent the type of object that the button represents AUTO: AutoRobot CONT: ControlledRobot OBST: Obstacle.

Public Member Functions

- CheckableButton (const QString &text, QWidget *parent=nullptr, ObjectType type=ObjectType::OBST)
  Constructor for CheckableButton.
- OverlayWidget * getOverlay () const
  Get the overlay widget of the button.
- void setOverlay (OverlayWidget *overlay)
  Set the overlay widget of the button.

Protected Member Functions

- QPoint getWidgetPos (QPoint localPos)
  Get the position of the widget on the grid.

Protected Attributes

- OverlayWidget * overlay
  Pointer to the overlay widget.
- ObjectType objType
  The type of object that the button represents.

Private Slots

- void mousePressEvent (QMouseEvent *event) override
  Override the mousePressEvent method.
- void mouseMoveEvent (QMouseEvent *event) override
  Override the mouseMoveEvent method.
- void mouseReleaseEvent (QMouseEvent *event) override
  Override the mouseReleaseEvent method.

5.2.1 Detailed Description

A class to represent a checkable button.

This class inherits from QPushButton and provides functionalities for a button that can be checked and unchecked. It also has an OverlayWidget that is used to draw the object on the grid.

See also

QPushButton

5.2.2 Member Enumeration Documentation

5.2.2.1 ObjectType

`enum CheckableButton::ObjectType`

Enum to represent the type of object that the button represents AUTO: AutoRobot CONT: ControlledRobot OBST: Obstacle.

-

Enumerator

AUTO	
CONT	
OBST	

5.2.3 Constructor & Destructor Documentation

5.2.3.1 CheckableButton()

```
CheckableButton::CheckableButton (
            const QString & text,
            QWidget * parent = nullptr,
            ObjectType type = ObjectType::OBST )  [explicit]
```

Constructor for CheckableButton.

Parameters

text	The text to be displayed on the button.
parent	The parent QWidget.
type	The type of object that the button represents.

5.2.4 Member Function Documentation

5.2.4.1 getOverlay()

```
OverlayWidget * CheckableButton::getOverlay ( ) const  [inline]
```

Get the overlay widget of the button.

Returns

OverlayWidget∗ The overlay widget of the button

5.2.4.2 getWidgetPos()

```
QPoint CheckableButton::getWidgetPos (
            QPoint localPos )  [protected]
```

Get the position of the widget on the grid.

Parameters

localPos	The local position of the mouse.

Returns

QPoint The position in the overlay widget.

5.2.4.3 mouseMoveEvent

```
void CheckableButton::mouseMoveEvent (
            QMouseEvent * event )  [override], [private], [slot]
```

Override the mouseMoveEvent method.

Parameters

event	The mouse event

Returns

void

5.2.4.4 mousePressEvent

```
void CheckableButton::mousePressEvent (
            QMouseEvent * event )  [override], [private], [slot]
```

Override the mousePressEvent method.

Parameters

event	The mouse event

Returns

void

5.2.4.5 mouseReleaseEvent

```
void CheckableButton::mouseReleaseEvent (
            QMouseEvent * event )  [override], [private], [slot]
```

Override the mouseReleaseEvent method.

Parameters

event	The mouse event

Returns

void

5.2.4.6 setOverlay()

```
void CheckableButton::setOverlay (
            OverlayWidget * overlay )  [inline]
```

Set the overlay widget of the button.

Parameters

overlay	The overlay widget to set

Returns

void

5.2.5 Member Data Documentation

5.2.5.1 objType

```
ObjectType CheckableButton::objType  [protected]
```

The type of object that the button represents.

5.2.5.2 overlay

```
OverlayWidget* CheckableButton::overlay  [protected]
```

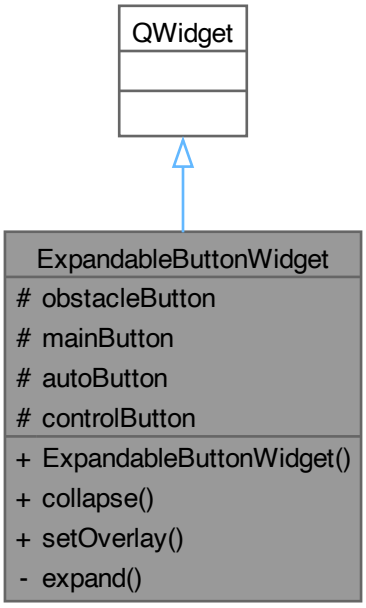
Pointer to the overlay widget.

5.3 ExpandableButtonWidget Class Reference

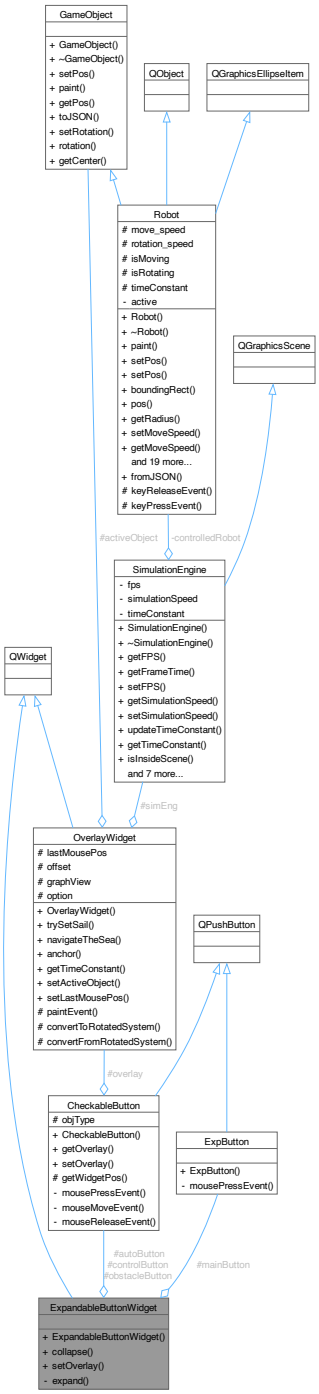
A class to represent an expandable button widget.

```
#include <expbuttonwidget.hpp>
```

Inheritance diagram for ExpandableButtonWidget:



Collaboration diagram for ExpandableButtonWidget:



Public Member Functions

- ExpandableButtonWidget (QWidget *parent=nullptr)

  Construct a new Expandable Button Widget object.
- void collapse ()

  Get the obstacle button.
- void setOverlay (OverlayWidget *overlay)

  Get the obstacle button.

Protected Attributes

- CheckableButton * obstacleButton

  Reference to the obstacle button.
- ExpButton * mainButton

  Reference to the main button.
- CheckableButton * autoButton

  Reference to the auto button.
- CheckableButton * controlButton

  Reference to the control button.

Private Slots

- void expand ()

  Slot to handle the main button press event.

5.3.1 Detailed Description

A class to represent an expandable button widget.

This class provides an interface for creating and managing expandable button widgets.

See also

QWidget

5.3.2 Constructor & Destructor Documentation

5.3.2.1 ExpandableButtonWidget()

```
ExpandableButtonWidget::ExpandableButtonWidget (
            QWidget * parent = nullptr )  [explicit]
```

Construct a new Expandable Button Widget object.

Parameters

parent	The parent widget. Default is nullptr.

5.3.3 Member Function Documentation

5.3.3.1 collapse()

```
void ExpandableButtonWidget::collapse ( )
```

Get the obstacle button.

Returns

CheckableButton* The obstacle button.

5.3.3.2 expand

```
void ExpandableButtonWidget::expand ( )  [private], [slot]
```

Slot to handle the main button press event.

Returns

void

5.3.3.3 setOverlay()

```
void ExpandableButtonWidget::setOverlay (
            OverlayWidget * overlay )
```

Get the obstacle button.

Returns

CheckableButton* The obstacle button.

5.3.4 Member Data Documentation

5.3.4.1 autoButton

```
CheckableButton* ExpandableButtonWidget::autoButton  [protected]
```

Reference to the auto button.

5.3.4.2 controlButton

```
CheckableButton* ExpandableButtonWidget::controlButton  [protected]
```

Reference to the control button.

5.3.4.3 mainButton

```
ExpButton* ExpandableButtonWidget::mainButton  [protected]
```

Reference to the main button.

5.3.4.4 obstacleButton

```
CheckableButton* ExpandableButtonWidget::obstacleButton  [protected]
```

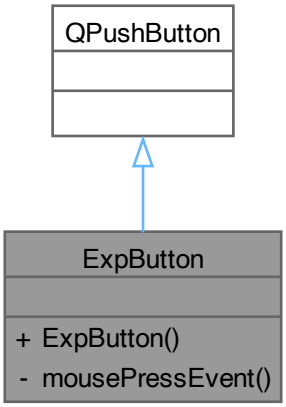
Reference to the obstacle button.

5.4 ExpButton Class Reference

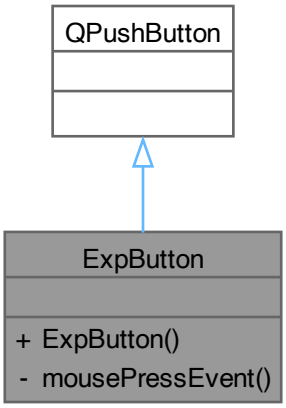
A class for expandable buttons.

```
#include <expbutton.hpp>
```

Inheritance diagram for ExpButton:



Collaboration diagram for ExpButton:



Signals

- void pressed ()

  Signal emitted when the button is pressed.

Public Member Functions

- ExpButton (const QString &text, QWidget *parent=nullptr)

  Constructor for ExpButton.

Private Slots

- void mousePressEvent (QMouseEvent *event) override

  Slot to handle the button press event.

5.4.1 Detailed Description

A class for expandable buttons.

This class inherits from QPushButton and emits a signal when pressed.

See also

QPushButton

5.4.2 Constructor & Destructor Documentation

5.4.2.1 ExpButton()

```
ExpButton::ExpButton (
            const QString & text,
            QWidget * parent = nullptr )  [explicit]
```

Constructor for ExpButton.

Parameters

text	The text to be displayed on the button.
parent	The parent QWidget.

5.4.3 Member Function Documentation

5.4.3.1 mousePressEvent

```
void ExpButton::mousePressEvent (
            QMouseEvent * event )  [override], [private], [slot]
```

Slot to handle the button press event.

Parameters

event	The QMouseEvent that triggered the slot.

Returns

void

5.4.3.2 pressed

```
void ExpButton::pressed ( )  [signal]
```

Signal emitted when the button is pressed.

Returns

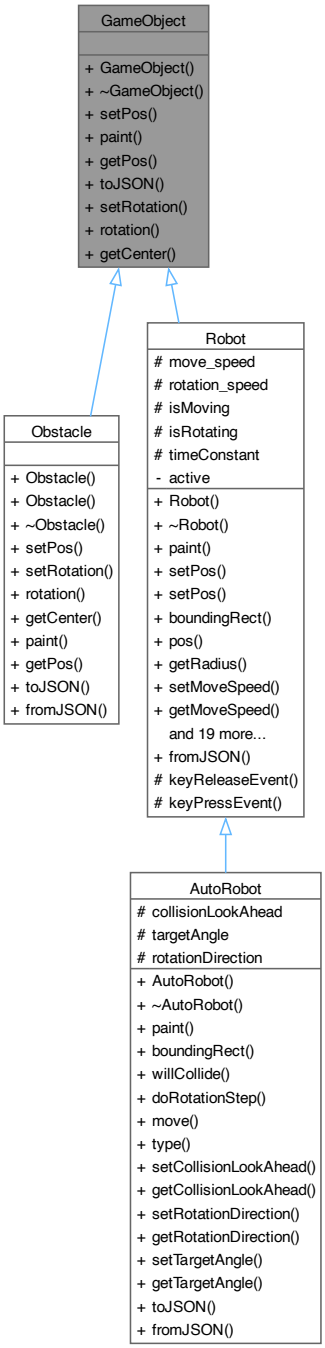
void

5.5 GameObject Class Reference

A class to represent a game object in the simulation.

```
#include <gameobject.hpp>
```

Inheritance diagram for GameObject:



Collaboration diagram for GameObject:

Public Member Functions

- GameObject ()=default
- ~GameObject ()=default
- virtual void setPos (qreal x, qreal y)=0

  Set the position of the game object.
- virtual void paint (QPainter *painter, const QStyleOptionGraphicsItem *option, QWidget *widget)=0

  Paint the game object.
- virtual QPointF getPos ()=0

  Get the position of the game object.
- virtual QJsonObject toJSON ()=0

  Convert the game object to a JSON object.
- virtual void setRotation (qreal angle)=0

  Set the rotation of the game object.
- virtual qreal rotation ()=0

  Get the rotation of the game object.
- virtual QPointF getCenter ()=0

  Get the center of the game object.

5.5.1 Detailed Description

A class to represent a game object in the simulation.

This class provides an interface for creating and managing game objects.

5.5.2 Constructor & Destructor Documentation

5.5.2.1 GameObject()

```
GameObject::GameObject ( )  [default]
```

5.5.2.2 ~GameObject()

```
GameObject::~GameObject ( )  [default]
```

5.5.3 Member Function Documentation

5.5.3.1 getCenter()

```
virtual QPointF GameObject::getCenter ( )  [pure virtual]
```

Get the center of the game object.

Returns

QPointF

Implemented in Obstacle, and Robot.

5.5.3.2 getPos()

```
virtual QPointF GameObject::getPos ( )  [pure virtual]
```

Get the position of the game object.

Returns

QPointF

Implemented in Obstacle, and Robot.

5.5.3.3 paint()

```
virtual void GameObject::paint (
            QPainter * painter,
            const QStyleOptionGraphicsItem * option,
            QWidget * widget )  [pure virtual]
```

Paint the game object.

Parameters

painter	
option	
widget	

Returns

void

Implemented in AutoRobot, Obstacle, and Robot.

5.5.3.4 rotation()

```
virtual qreal GameObject::rotation ( )  [pure virtual]
```

Get the rotation of the game object.

Returns

qreal

Implemented in Obstacle, and Robot.

5.5.3.5 setPos()

```
virtual void GameObject::setPos (
            qreal x,
            qreal y )  [pure virtual]
```

Set the position of the game object.

Parameters

x	
y	

Returns

void

Implemented in Obstacle, and Robot.

5.5.3.6 setRotation()

```
virtual void GameObject::setRotation (
            qreal angle )  [pure virtual]
```

Set the rotation of the game object.

Parameters

angle	

Returns

void

Implemented in Obstacle, and Robot.

5.5.3.7 toJSON()

```
virtual QJsonObject GameObject::toJSON ( )  [pure virtual]
```

Convert the game object to a JSON object.

Returns

QJsonObject

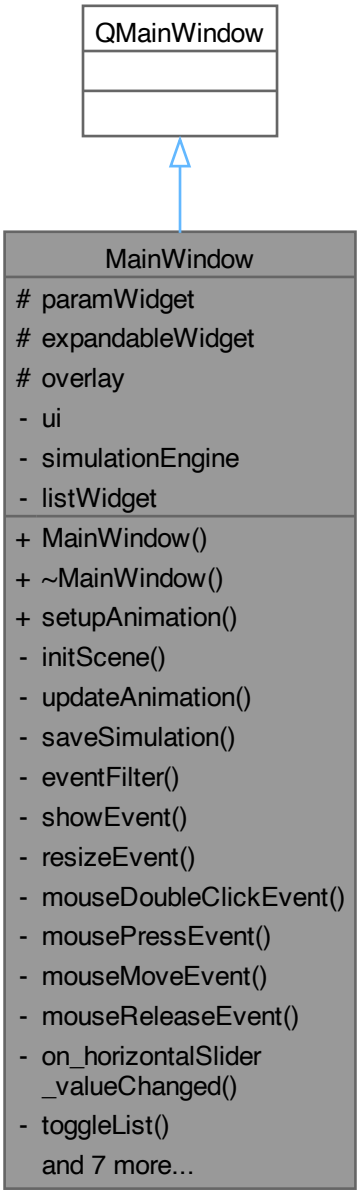
Implemented in AutoRobot, Obstacle, and Robot.

5.6 MainWindow Class Reference

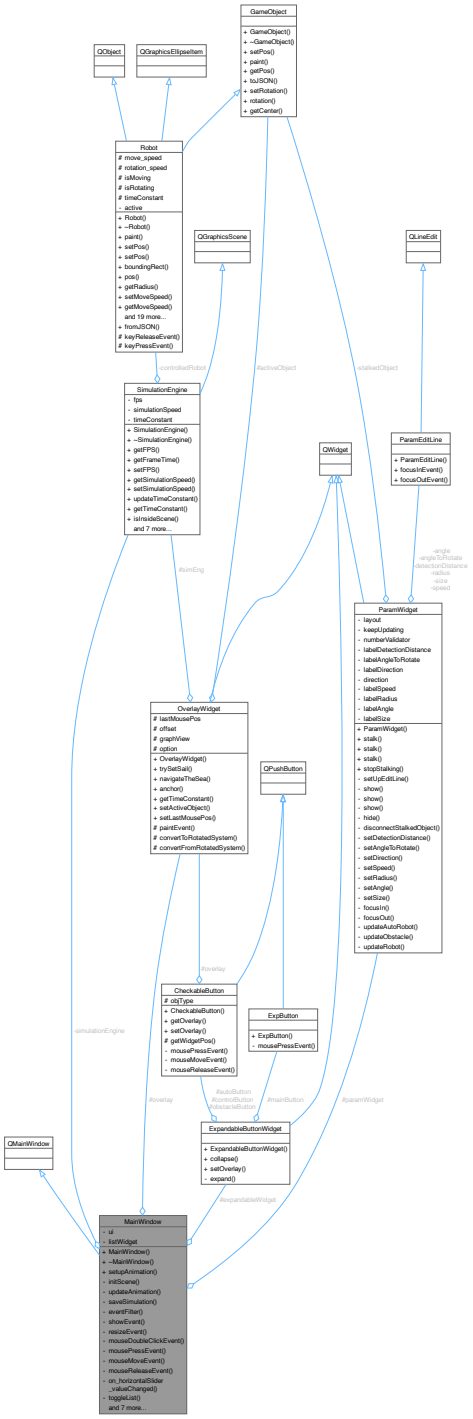
A class to represent the main window of the application.

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

Inheritance diagram for MainWindow:



Collaboration diagram for MainWindow:



Public Member Functions

- MainWindow (QWidget ∗parent=nullptr)
- ∼MainWindow ()
- void setupAnimation ()

Protected Attributes

- ParamWidget * paramWidget

  The param widget.
- ExpandableButtonWidget * expandableWidget

  The expandable button widget.
- OverlayWidget * overlay

  The overlay widget.

Private Slots

- void saveSimulation ()

  Slot to handle the save button click event.
- bool eventFilter (QObject *object, QEvent *event) override

  Overridden event filter method to handle key press events.
- void showEvent (QShowEvent *event) override

  Overriden show event method to handle the show event.
- void resizeEvent (QResizeEvent *event) override

  Overriden resize event method to handle the resize event.
- void mouseDoubleClickEvent (QMouseEvent *event) override

  Overriden close event method to handle the close event.
- void mousePressEvent (QMouseEvent *event) override

  Overriden mouse press event method to handle the mouse press event.
- void mouseMoveEvent (QMouseEvent *event) override

  Overriden mouse move event method to handle the mouse move event.
- void mouseReleaseEvent (QMouseEvent *event) override

  Overriden mouse release event method to handle the mouse release event.
- void on_horizontalSlider_valueChanged (int value)

  Slot to handle the horizontal slider value changed event.
- void toggleList ()

  Slot to handle toggling the list.
- void handleItemDoubleClick (QListWidgetItem *item)

  Slot to handle the item double click event from the list.
- void on_pushButton_clicked ()

  Slot to handle clear button click event.
- void goLeft ()

  Slot to handle rotate anticlockwise button click event.
- void stopRotating ()

  Slot to handle stop rotating button click event.
- void goRight ()

  Slot to handle rotate clockwise button click event.
- void goStraight ()

  Slot to handle move forward button click event.
- void stopMoving ()

  Slot to handle stop moving button click event.

Private Member Functions

- void initScene ()
- void updateAnimation ()

Private Attributes

- Ui::MainWindow * ui

  The UI object.
- SimulationEngine * simulationEngine

  The simulation engine.
- QListWidget * listWidget

  The list widget.

5.6.1 Detailed Description

A class to represent the main window of the application.

This class inherits from QMainWindow and provides the main window of the application.

See also

QMainWindow

5.6.2 Constructor & Destructor Documentation

5.6.2.1 MainWindow()

```
MainWindow::MainWindow (
            QWidget * parent = nullptr )
```

5.6.2.2 ~MainWindow()

```
MainWindow::~MainWindow ( )
```

5.6.3 Member Function Documentation

5.6.3.1 eventFilter

```
bool MainWindow::eventFilter (
            QObject * object,
            QEvent * event )  [override], [private], [slot]
```

Overridden event filter method to handle key press events.

Parameters

object	The object that the event is being filtered for
event	The event that is being filtered

Returns

bool Whether the event was handled

5.6.3.2 goLeft

```
void MainWindow::goLeft ( )  [private], [slot]
```

Slot to handle rotate anticlockwise button click event.

Returns

void

5.6.3.3 goRight

```
void MainWindow::goRight ( )  [private], [slot]
```

Slot to handle rotate clockwise button click event.

Returns

void

5.6.3.4 goStraight

```
void MainWindow::goStraight ( )  [private], [slot]
```

Slot to handle move forward button click event.

Returns

void

5.6.3.5 handleItemDoubleClick

```
void MainWindow::handleItemDoubleClick (
            QListWidgetItem * item )  [private], [slot]
```

Slot to handle the item double click event from the list.

Parameters

item	The item that was double clicked

Returns

void

5.6.3.6 initScene()

```
void MainWindow::initScene ( )  [private]
```

5.6.3.7 mouseDoubleClickEvent

```
void MainWindow::mouseDoubleClickEvent (
            QMouseEvent * event )  [override], [private], [slot]
```

Overriden close event method to handle the close event.

Parameters

event	The close event

Returns

void

5.6.3.8 mouseMoveEvent

```
void MainWindow::mouseMoveEvent (
            QMouseEvent * event )  [override], [private], [slot]
```

Overriden mouse move event method to handle the mouse move event.

Parameters

event	The mouse move event

Returns

void

5.6.3.9 mousePressEvent

```
void MainWindow::mousePressEvent (
            QMouseEvent * event )  [override], [private], [slot]
```

Overriden mouse press event method to handle the mouse press event.

Parameters

event	The mouse press event

Returns

void

5.6.3.10 mouseReleaseEvent

```
void MainWindow::mouseReleaseEvent (
            QMouseEvent * event )  [override], [private], [slot]
```

Overriden mouse release event method to handle the mouse release event.

Parameters

event	The mouse release event

Returns

void

5.6.3.11 on_horizontalSlider_valueChanged

```
void MainWindow::on_horizontalSlider_valueChanged (
            int value )  [private], [slot]
```

Slot to handle the horizontal slider value changed event.

Parameters

value	The new value of the slider

Returns

void

5.6.3.12 on_pushButton_clicked

```
void MainWindow::on_pushButton_clicked ( )  [private], [slot]
```

Slot to handle clear button click event.

Returns

void

5.6.3.13 resizeEvent

```
void MainWindow::resizeEvent (
            QResizeEvent * event )  [override], [private], [slot]
```

Overriden resize event method to handle the resize event.

Parameters

event	The resize event

Returns

void

5.6.3.14 saveSimulation

```
void MainWindow::saveSimulation ( )  [private], [slot]
```

Slot to handle the save button click event.

Returns

void

5.6.3.15 setupAnimation()

```
void MainWindow::setupAnimation ( )
```

5.6.3.16 showEvent

```
void MainWindow::showEvent (
            QShowEvent * event )  [override], [private], [slot]
```

Overriden show event method to handle the show event.

Parameters

event	The show event

Returns

void

5.6.3.17 stopMoving

```
void MainWindow::stopMoving ( )  [private], [slot]
```

Slot to handle stop moving button click event.

Returns

void

5.6.3.18 stopRotating

```
void MainWindow::stopRotating ( )  [private], [slot]
```

Slot to handle stop rotating button click event.

Returns

void

5.6.3.19 toggleList

```
void MainWindow::toggleList ( )  [private], [slot]
```

Slot to handle toggling the list.

Returns

void

5.6.3.20 updateAnimation()

```
void MainWindow::updateAnimation ( )  [private]
```

5.6.4 Member Data Documentation

5.6.4.1 expandableWidget

```
ExpandableButtonWidget* MainWindow::expandableWidget  [protected]
```

The expandable button widget.

5.6.4.2 listWidget

```
QListWidget* MainWindow::listWidget  [private]
```

The list widget.

5.6.4.3 overlay

```
OverlayWidget* MainWindow::overlay  [protected]
```

The overlay widget.

5.6.4.4 paramWidget

```
ParamWidget* MainWindow::paramWidget  [protected]
```

The param widget.

5.6.4.5 simulationEngine

```
SimulationEngine* MainWindow::simulationEngine  [private]
```

The simulation engine.

5.6.4.6 ui

```
Ui::MainWindow* MainWindow::ui  [private]
```

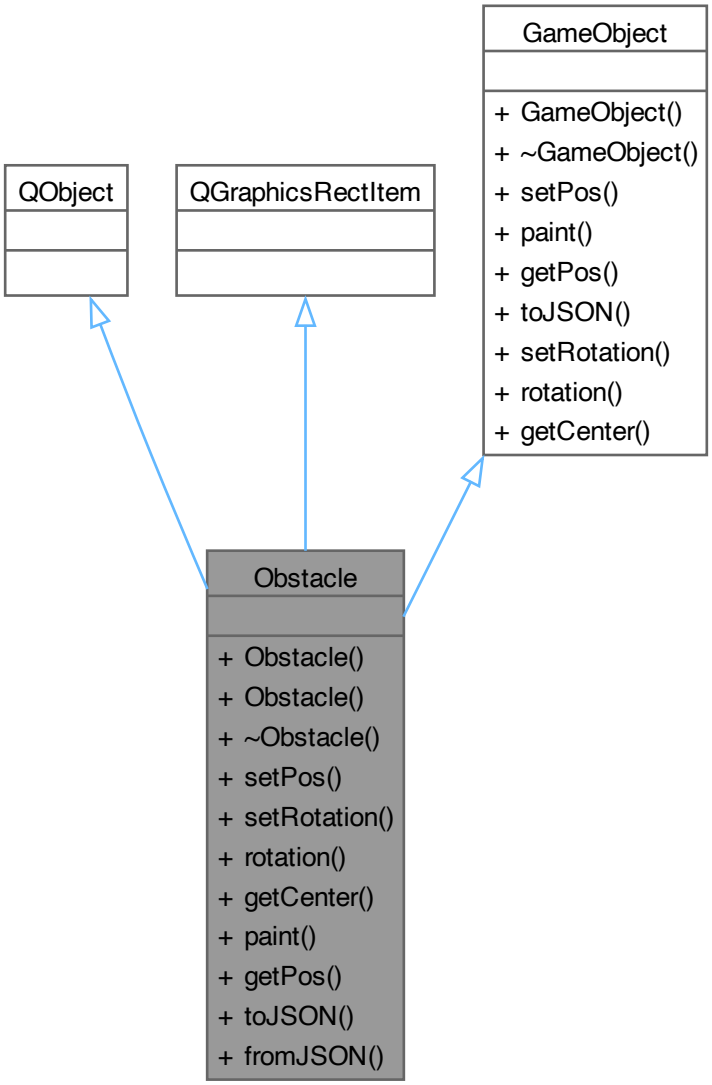
The UI object.

5.7 Obstacle Class Reference

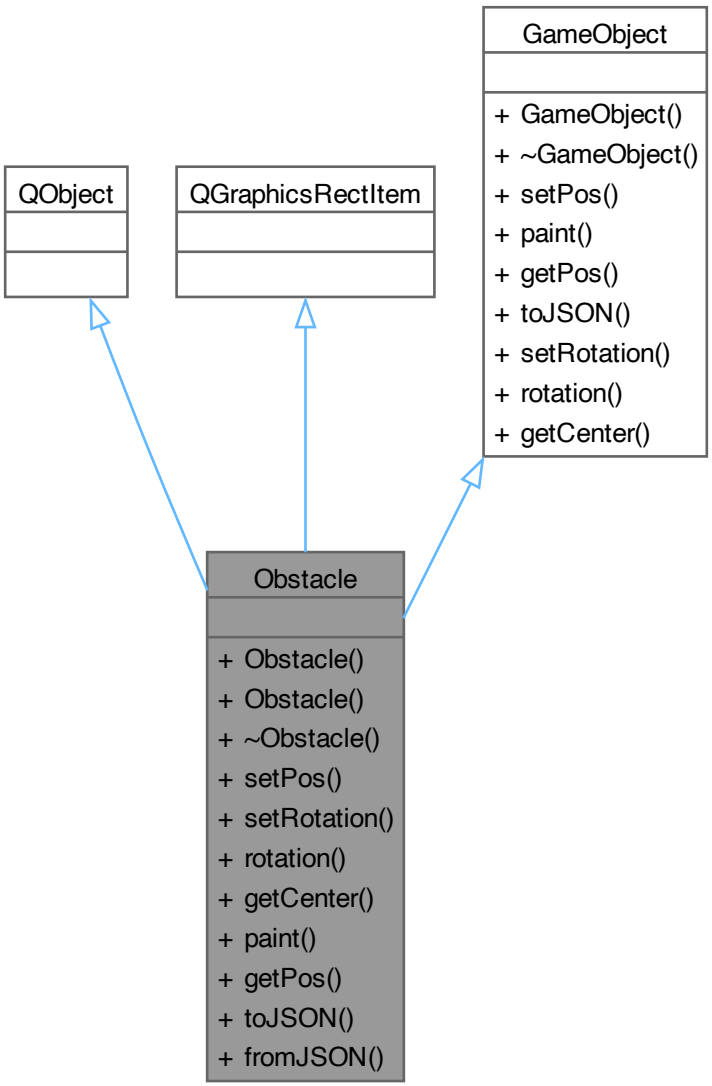
A class to represent an obstacle.

```
#include <obstacle.hpp>
```

Inheritance diagram for Obstacle:



Collaboration diagram for Obstacle:



Signals

- void paramsUpdated ()

  Signal emitted when the parameters of the obstacle are updated.
- void obstacleSepuku ()

  Signal emitted when the obstacle is removed.

Public Member Functions

- Obstacle (QGraphicsItem *parent=nullptr)

  Default constructor.

- Obstacle (const Obstacle &)

  Copy constructor.
- ∼Obstacle ()

  Destructor.
- void setPos (qreal x, qreal y) override

  Set the position of the obstacle.
- void setRotation (qreal angle) override

  Set the rotation of the obstacle.
- qreal rotation () override

  Get the rotation of the obstacle.
- QPointF getCenter () override

  Get the center of the obstacle.
- void paint (QPainter ∗painter, const QStyleOptionGraphicsItem ∗option, QWidget ∗widget) override

  Paint the obstacle.
- QPointF getPos () override

  Get the position of the obstacle.
- QJsonObject toJSON () override

  Convert the obstacle to a JSON object.

Public Member Functions inherited from GameObject

- GameObject ()=default
- ∼GameObject ()=default

Static Public Member Functions

- static Obstacle ∗ fromJSON (const QJsonObject &json)

  Create an Obstacle object from a JSON object.

5.7.1 Detailed Description

A class to represent an obstacle.

This class inherits from QGraphicsRectItem and GameObject. It represents an obstacle in a game.

5.7.2 Constructor & Destructor Documentation

5.7.2.1 Obstacle() [1/2]

```
Obstacle::Obstacle (
            QGraphicsItem * parent = nullptr )
```

Default constructor.

Parameters

parent	The parent QGraphicsItem.

Returns

void

5.7.2.2 Obstacle() [2/2]

```
Obstacle::Obstacle (
            const Obstacle &  )  [inline]
```

Copy constructor.

Parameters

Obstacle	The Obstacle object to copy.

Returns

void

5.7.2.3 ~Obstacle()

```
Obstacle::~Obstacle ( )
```

Destructor.

5.7.3 Member Function Documentation

5.7.3.1 fromJSON()

```
static Obstacle * Obstacle::fromJSON (
            const QJsonObject & json )  [static]
```

Create an Obstacle object from a JSON object.

Parameters

json	The QJsonObject to convert.

Returns

A pointer to the created Obstacle object.

5.7.3.2 getCenter()

```
QPointF Obstacle::getCenter ( )  [inline], [override], [virtual]
```

Get the center of the obstacle.

Returns

The center of the obstacle as a QPointF.

Implements GameObject.

5.7.3.3 getPos()

```
QPointF Obstacle::getPos ( )  [override], [virtual]
```

Get the position of the obstacle.

Returns

The position of the obstacle as a QPointF object.

Implements GameObject.

5.7.3.4 obstacleSepuku

```
void Obstacle::obstacleSepuku ( )  [signal]
```

Signal emitted when the obstacle is removed.

Returns

void

5.7.3.5 paint()

```
void Obstacle::paint (
            QPainter * painter,
            const QStyleOptionGraphicsItem * option,
            QWidget * widget )  [override], [virtual]
```

Paint the obstacle.

Parameters

painter	Pointer to the QPainter object.
option	Pointer to the QStyleOptionGraphicsItem object.
widget	Pointer to the QWidget object.

Implements GameObject.

5.7.3.6 paramsUpdated

```
void Obstacle::paramsUpdated ( )  [signal]
```

Signal emitted when the parameters of the obstacle are updated.

Returns

void

5.7.3.7 rotation()

```
qreal Obstacle::rotation ( )  [inline], [override], [virtual]
```

Get the rotation of the obstacle.

Returns

The rotation of the obstacle as a qreal.

Implements GameObject.

5.7.3.8 setPos()

```
void Obstacle::setPos (
            qreal x,
            qreal y )  [override], [virtual]
```

Set the position of the obstacle.

Parameters

x	The x-coordinate of the position.
y	The y-coordinate of the position.

Returns

void

Implements GameObject.

5.7.3.9 setRotation()

```
void Obstacle::setRotation (
            qreal angle )  [override], [virtual]
```

Set the rotation of the obstacle.

Parameters

angle	The angle of the rotation.

Returns

void

Implements GameObject.

5.7.3.10 toJSON()

```
QJsonObject Obstacle::toJSON ( )  [override], [virtual]
```

Convert the obstacle to a JSON object.

Returns

The obstacle as a QJsonObject.

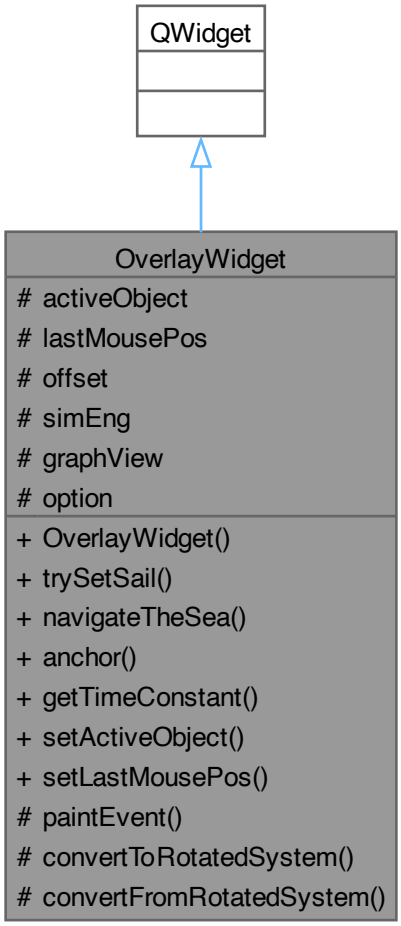
Implements GameObject.

5.8 OverlayWidget Class Reference

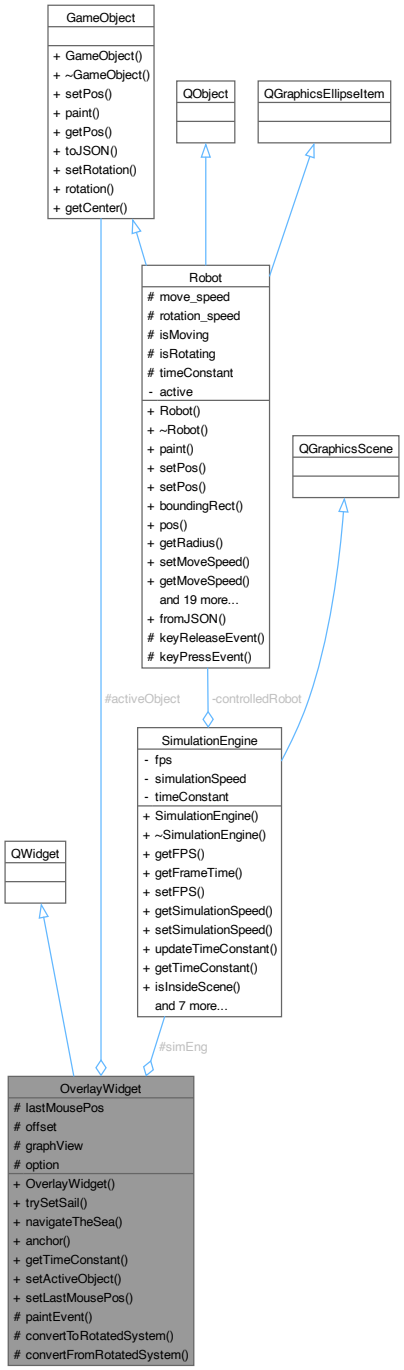
A class to represent an overlay widget.

```
#include <overlaywidget.hpp>
```

Inheritance diagram for OverlayWidget:



Collaboration diagram for OverlayWidget:



Public Member Functions

- OverlayWidget (QWidget *parent=nullptr, SimulationEngine *simEng=nullptr, QGraphicsView *graphView=nullptr)

  Construct a new Overlay Widget object.
- void trySetSail (QMouseEvent *event)

  Try grab the object based on the mouse position.
- void navigateTheSea (QMouseEvent *event)

Drag the object based on the mouse position in the overlay.

- void anchor ()

  Anchor the object based on the mouse position back to scene.
- qreal * getTimeConstant ()

  Get the time constant of the simulation engine.
- void setActiveObject (GameObject *obj)

  Get the active object.
- void setLastMousePos (QPoint pos)

  Get the last mouse position.

Protected Member Functions

- void paintEvent (QPaintEvent *event) override

  Override the mousePressEvent method.
- QPoint convertToRotatedSystem (QPoint point, qreal angle)

  Convert the point to the rotated system.
- QPoint convertFromRotatedSystem (QPoint point, qreal angle)

  Convert the point from the rotated system.

Protected Attributes

- GameObject * activeObject

  The active object.
- QPoint lastMousePos

  The last mouse position.
- QPoint offset
- SimulationEngine * simEng

  The simulation engine.
- QGraphicsView * graphView

  The graphics view.
- QStyleOptionGraphicsItem option

  The option for the graphics item.

5.8.1 Detailed Description

A class to represent an overlay widget.

This class provides an interface for creating and managing overlay widgets.

See also

QWidget

5.8.2 Constructor & Destructor Documentation

5.8.2.1 OverlayWidget()

```
OverlayWidget::OverlayWidget (
            QWidget * parent = nullptr,
            SimulationEngine * simEng = nullptr,
            QGraphicsView * graphView = nullptr )  [explicit]
```

Construct a new Overlay Widget object.

Parameters

parent	The parent widget. Default is nullptr.
simEng	The simulation engine. Default is nullptr.
graphView	The graphics view. Default is nullptr.

5.8.3 Member Function Documentation

5.8.3.1 anchor()

```
void OverlayWidget::anchor ( )
```

Anchor the object based on the mouse position back to scene.

Returns

void

5.8.3.2 convertFromRotatedSystem()

```
QPoint OverlayWidget::convertFromRotatedSystem (
            QPoint point,
            qreal angle )  [protected]
```

Convert the point from the rotated system.

Parameters

point	The point in the rotated system.
angle	The angle of the rotation.

Returns

QPoint The point in the rotated system.

5.8.3.3 convertToRotatedSystem()

```
QPoint OverlayWidget::convertToRotatedSystem (
            QPoint point,
            qreal angle )  [protected]
```

Convert the point to the rotated system.

Parameters

point	The point in the scene.
angle	The angle of the rotation.

Returns

QPoint The point in the rotated system.

5.8.3.4 getTimeConstant()

```
qreal * OverlayWidget::getTimeConstant ( )  [inline]
```

Get the time constant of the simulation engine.

Returns

qreal* The time constant of the simulation engine.

5.8.3.5 navigateTheSea()

```
void OverlayWidget::navigateTheSea (
            QMouseEvent * event )
```

Drag the object based on the mouse position in the overlay.

Parameters

event	The mouse event.

Returns

void

5.8.3.6 paintEvent()

```
void OverlayWidget::paintEvent (
            QPaintEvent * event )  [override], [protected]
```

Override the mousePressEvent method.

Parameters

event	The mouse event.

Returns

void

5.8.3.7 setActiveObject()

```
void OverlayWidget::setActiveObject (
            GameObject * obj )  [inline]
```

Get the active object.

Returns

GameObject* The active object.

5.8.3.8 setLastMousePos()

```
void OverlayWidget::setLastMousePos (
            QPoint pos )  [inline]
```

Get the last mouse position.

Returns

QPoint The last mouse position.

5.8.3.9 trySetSail()

```
void OverlayWidget::trySetSail (
            QMouseEvent * event )
```

Try grab the object based on the mouse position.

Parameters

event	The mouse event.

Returns

void

5.8.4 Member Data Documentation

5.8.4.1 activeObject

```
GameObject* OverlayWidget::activeObject  [protected]
```

The active object.

5.8.4.2 graphView

```
QGraphicsView* OverlayWidget::graphView  [protected]
```

The graphics view.

5.8.4.3 lastMousePos

```
QPoint OverlayWidget::lastMousePos  [protected]
```

The last mouse position.

5.8.4.4 offset

```
QPoint OverlayWidget::offset  [protected]
```

5.8.4.5 option

```
QStyleOptionGraphicsItem OverlayWidget::option  [protected]
```

The option for the graphics item.

5.8.4.6 simEng

```
SimulationEngine* OverlayWidget::simEng  [protected]
```

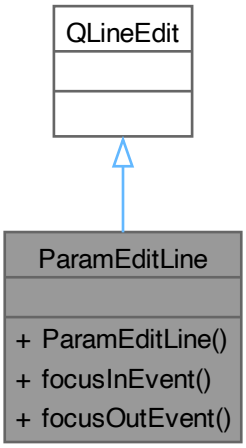
The simulation engine.

5.9 ParamEditLine Class Reference

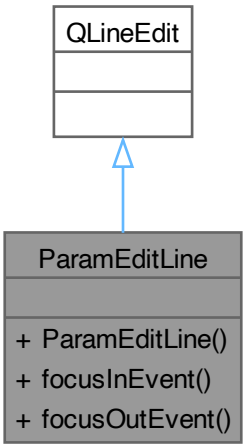
A class to represent a line edit widget for editing parameters.

```
#include <parameditline.hpp>
```

Inheritance diagram for ParamEditLine:



Collaboration diagram for ParamEditLine:



Signals

- void focusIn ()

  Signal emitted when the line edit widget gains focus.
- void focusOut ()

  Signal emitted when the line edit widget loses focus.

Public Member Functions

- ParamEditLine (QWidget ∗parent=nullptr)

  Default constructor.
- void focusInEvent (QFocusEvent ∗event) override

  Overridden focusInEvent method.
- void focusOutEvent (QFocusEvent ∗event) override

  Overridden focusOutEvent method.

5.9.1 Detailed Description

A class to represent a line edit widget for editing parameters.

This class inherits from QLineEdit and provides a line edit widget for editing parameters.

See also

QLineEdit

5.9.2 Constructor & Destructor Documentation

5.9.2.1 ParamEditLine()

```
ParamEditLine::ParamEditLine (
            QWidget * parent = nullptr )  [inline], [explicit]
```

Default constructor.

Parameters

parent	The parent widget.

5.9.3 Member Function Documentation

5.9.3.1 focusIn

```
void ParamEditLine::focusIn ( )  [signal]
```

Signal emitted when the line edit widget gains focus.

Returns

void

5.9.3.2 focusInEvent()

```
void ParamEditLine::focusInEvent (
            QFocusEvent * event )  [inline], [override]
```

Overridden focusInEvent method.

Parameters

event	The focus event.

Returns

void

5.9.3.3 focusOut

```
void ParamEditLine::focusOut ( )  [signal]
```

Signal emitted when the line edit widget loses focus.

Returns

void

5.9.3.4 focusOutEvent()

```
void ParamEditLine::focusOutEvent (
            QFocusEvent * event )  [inline], [override]
```

Overridden focusOutEvent method.

Parameters

event	The focus event.

Returns

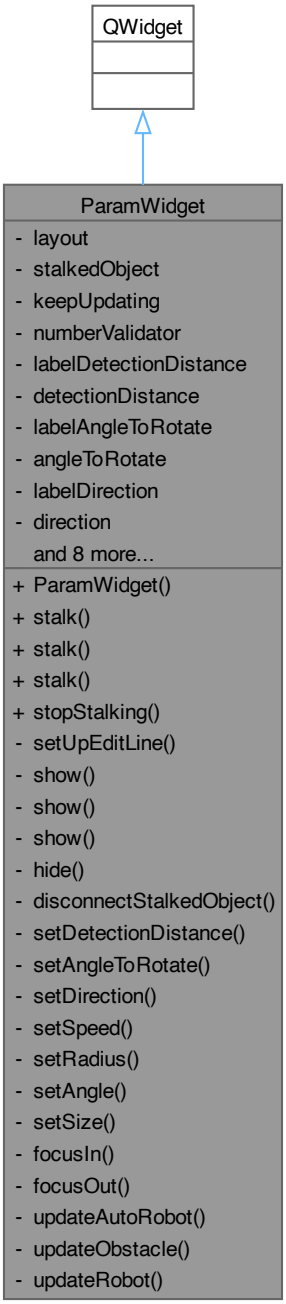
void

5.10 ParamWidget Class Reference

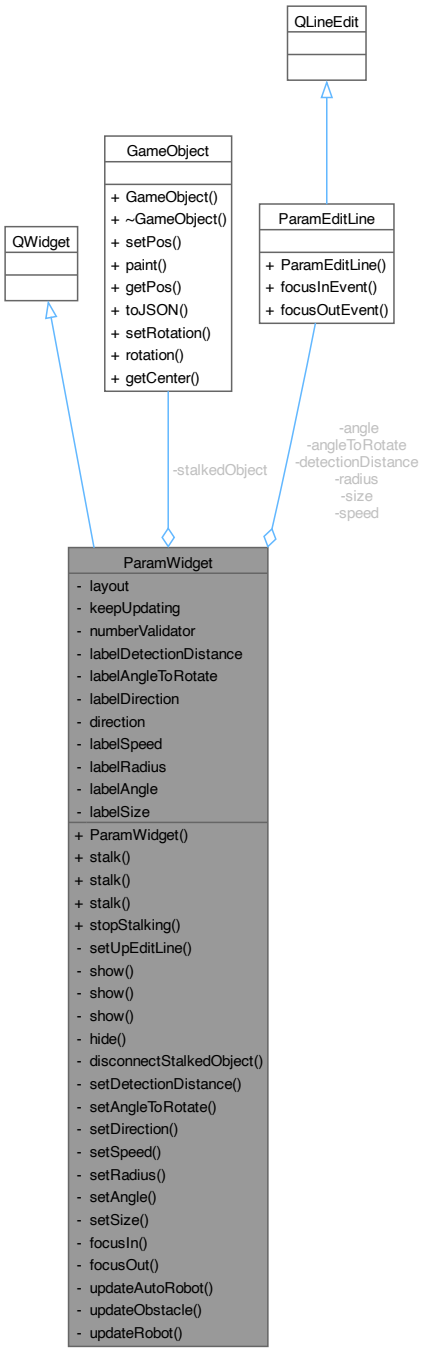
A class to represent a widget for editing parameters of game objects.

`#include <paramwidget.hpp>`

Inheritance diagram for ParamWidget:



Collaboration diagram for ParamWidget:



Public Member Functions

- ParamWidget (QWidget *parent=nullptr)

  Default constructor.
- void stalk (AutoRobot *robot)

  Set the game object whose parameters will be displayed.
- void stalk (Obstacle *obstacle)

Set the game object whose parameters will be displayed.

- void stalk (Robot *robot)

  Set the game object whose parameters will be displayed.

- void stopStalking ()

  Stop editing the parameters of the game object.

Private Slots

- void setDetectionDistance ()

  Signal to set the detection distance of the game object.

- void setAngleToRotate ()

  Signal to set the angle to rotate of the game object.

- void setDirection ()

  Signal to set the direction of the game object.

- void setSpeed ()

  Signal to set the speed of the game object.

- void setRadius ()

  Signal to set the radius of the game object.

- void setAngle ()

  Signal to set the angle of the game object.

- void setSize ()

  Signal to set the size of the game object.

- void focusIn ()

  Signal to update the parameters of the game object.

- void focusOut ()

  Signal to update the parameters of the game object.

- void updateAutoRobot ()

  Update the parameters of the game object.

- void updateObstacle ()

  Update the parameters of the game object.

- void updateRobot ()

  Update the parameters of the game object.

Private Member Functions

- void setUpEditLine (ParamEditLine *lineEdit, QLabel *label)

  Set up the line edit widget for editing a parameter.

- void show (Robot *robot)

  Show the parameters of the game object.

- void show (AutoRobot *robot)

  Show the parameters of the game object.

- void show (Obstacle *obstacle)

  Show the parameters of the game object.

- void hide ()

  Hide the widget.

- void disconnectStalkedObject ()

  Disconnect the widget from the game object.

Private Attributes

- QVBoxLayout * layout

  The layout of the widget.
- GameObject * stalkedObject = nullptr

  The game object whose parameters are being displayed.
- bool keepUpdating = true

  Whether the widget should keep updating the parameters of the game object.
- QDoubleValidator * numberValidator

  The validator for the number input.
- QLabel * labelDetectionDistance

  The labels and line edit widgets for editing the parameters.
- ParamEditLine * detectionDistance
- QLabel * labelAngleToRotate
- ParamEditLine * angleToRotate
- QLabel * labelDirection
- QCheckBox * direction
- QLabel * labelSpeed
- ParamEditLine * speed
- QLabel * labelRadius
- ParamEditLine * radius
- QLabel * labelAngle
- ParamEditLine * angle
- QLabel * labelSize
- ParamEditLine * size

5.10.1 Detailed Description

A class to represent a widget for editing parameters of game objects.

This class inherits from QWidget and provides a widget for editing parameters of game objects.

See also

QWidget

5.10.2 Constructor & Destructor Documentation

5.10.2.1 ParamWidget()

```
ParamWidget::ParamWidget (
            QWidget * parent = nullptr )  [explicit]
```

Default constructor.

Parameters

parent	The parent widget.

5.10.3 Member Function Documentation

5.10.3.1 disconnectStalkedObject()

```
void ParamWidget::disconnectStalkedObject ( )  [private]
```

Disconnect the widget from the game object.

Returns

void

5.10.3.2 focusIn

```
void ParamWidget::focusIn ( )  [inline], [private], [slot]
```

Signal to update the parameters of the game object.

Returns

void

5.10.3.3 focusOut

```
void ParamWidget::focusOut ( )  [inline], [private], [slot]
```

Signal to update the parameters of the game object.

Returns

void

5.10.3.4 hide()

```
void ParamWidget::hide ( )  [private]
```

Hide the widget.

Returns

void

5.10.3.5 setAngle

```
void ParamWidget::setAngle ( )  [private], [slot]
```

Signal to set the angle of the game object.

Returns

void

5.10.3.6 setAngleToRotate

```
void ParamWidget::setAngleToRotate ( )  [private], [slot]
```

Signal to set the angle to rotate of the game object.

Returns

void

5.10.3.7 setDetectionDistance

```
void ParamWidget::setDetectionDistance ( )  [private], [slot]
```

Signal to set the detection distance of the game object.

Returns

void

5.10.3.8 setDirection

```
void ParamWidget::setDirection ( )  [private], [slot]
```

Signal to set the direction of the game object.

Returns

void

5.10.3.9 setRadius

```
void ParamWidget::setRadius ( )  [private], [slot]
```

Signal to set the radius of the game object.

Returns

void

5.10.3.10 setSize

```
void ParamWidget::setSize ( )  [private], [slot]
```

Signal to set the size of the game object.

Returns

void

5.10.3.11 setSpeed

```
void ParamWidget::setSpeed ( )  [private], [slot]
```

Signal to set the speed of the game object.

Returns

void

5.10.3.12 setUpEditLine()

```
void ParamWidget::setUpEditLine (
            ParamEditLine * lineEdit,
            QLabel * label )  [private]
```

Set up the line edit widget for editing a parameter.

Parameters

lineEdit	The line edit widget.
label	The label for the line edit widget.

Returns

void

5.10.3.13 show() [1/3]

```
void ParamWidget::show (
            AutoRobot * robot )  [private]
```

Show the parameters of the game object.

Parameters

robot	The robot whose parameters will be displayed.

Returns

void

5.10.3.14 show() [2/3]

```
void ParamWidget::show (
            Obstacle * obstacle )  [private]
```

Show the parameters of the game object.

Parameters

obstacle	The obstacle whose parameters will be displayed.

Returns

void

5.10.3.15 show() [3/3]

```
void ParamWidget::show (
            Robot * robot )  [private]
```

Show the parameters of the game object.

Parameters

robot	The robot whose parameters will be displayed.

Returns

void

5.10.3.16 stalk() [1/3]

```
void ParamWidget::stalk (
            AutoRobot * robot )
```

Set the game object whose parameters will be displayed.

Parameters

object	The game object.

Returns

void

5.10.3.17 stalk() [2/3]

```
void ParamWidget::stalk (
            Obstacle * obstacle )
```

Set the game object whose parameters will be displayed.

Parameters

object	The game object.

Returns

void

5.10.3.18 stalk() [3/3]

```
void ParamWidget::stalk (
            Robot * robot )
```

Set the game object whose parameters will be displayed.

Parameters

object	The game object.

Returns

void

5.10.3.19 stopStalking()

```
void ParamWidget::stopStalking ( )
```

Stop editing the parameters of the game object.

Returns

void

5.10.3.20 updateAutoRobot

```
void ParamWidget::updateAutoRobot ( )  [private], [slot]
```

Update the parameters of the game object.

Returns

void

5.10.3.21 updateObstacle

```
void ParamWidget::updateObstacle ( )  [private], [slot]
```

Update the parameters of the game object.

Returns

void

5.10.3.22 updateRobot

```
void ParamWidget::updateRobot ( )  [private], [slot]
```

Update the parameters of the game object.

Returns

void

5.10.4 Member Data Documentation

5.10.4.1 angle

```
ParamEditLine* ParamWidget::angle  [private]
```

5.10.4.2 angleToRotate

```
ParamEditLine* ParamWidget::angleToRotate  [private]
```

5.10.4.3 detectionDistance

```
ParamEditLine* ParamWidget::detectionDistance  [private]
```

5.10.4.4 direction

```
QCheckBox* ParamWidget::direction  [private]
```

5.10.4.5 keepUpdating

```
bool ParamWidget::keepUpdating = true  [private]
```

Whether the widget should keep updating the parameters of the game object.

5.10.4.6 labelAngle

```
QLabel* ParamWidget::labelAngle  [private]
```

5.10.4.7 labelAngleToRotate

```
QLabel* ParamWidget::labelAngleToRotate  [private]
```

5.10.4.8 labelDetectionDistance

```
QLabel* ParamWidget::labelDetectionDistance  [private]
```

The labels and line edit widgets for editing the parameters.

5.10.4.9 labelDirection

```
QLabel* ParamWidget::labelDirection  [private]
```

5.10.4.10 labelRadius

```
QLabel* ParamWidget::labelRadius  [private]
```

5.10.4.11 labelSize

```
QLabel* ParamWidget::labelSize  [private]
```

5.10.4.12 labelSpeed

```
QLabel* ParamWidget::labelSpeed  [private]
```

5.10.4.13 layout

```
QVBoxLayout* ParamWidget::layout  [private]
```

The layout of the widget.

5.10.4.14 numberValidator

```
QDoubleValidator* ParamWidget::numberValidator  [private]
```

The validator for the number input.

5.10.4.15 radius

```
ParamEditLine* ParamWidget::radius  [private]
```

5.10.4.16 size

```
ParamEditLine* ParamWidget::size  [private]
```

5.10.4.17 speed

```
ParamEditLine* ParamWidget::speed  [private]
```

5.10.4.18 stalkedObject

```
GameObject* ParamWidget::stalkedObject = nullptr  [private]
```

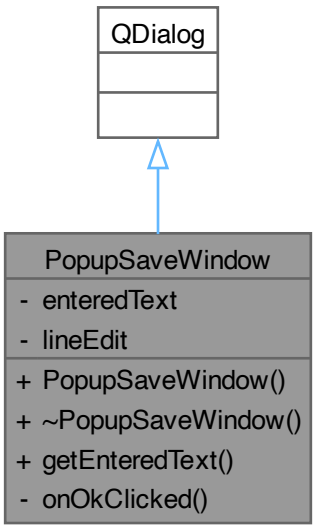
The game object whose parameters are being displayed.

5.11 PopupSaveWindow Class Reference

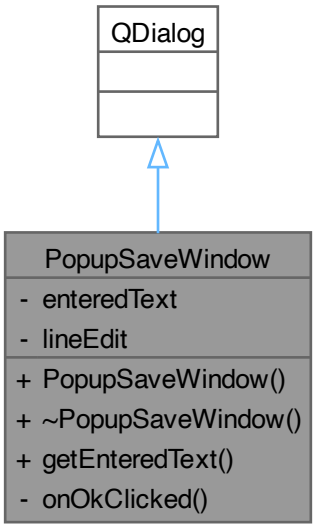
A class to represent a popup save window.

`#include <popupsavewindow.h>`

Inheritance diagram for PopupSaveWindow:



Collaboration diagram for PopupSaveWindow:



Public Member Functions

- PopupSaveWindow (QWidget *parent=nullptr)
  Construct a new Popup Save Window object.
- ~PopupSaveWindow ()
- QString getEnteredText ()
  Get the entered text.

Private Slots

- void onOkClicked ()
  Slot to handle the ok button click event.

Private Attributes

- QString enteredText
  The entered text.
- QLineEdit * lineEdit
  The line edit widget.

5.11.1 Detailed Description

A class to represent a popup save window.

This class provides an interface for creating and managing a popup save window.

See also

QDialog

5.11.2 Constructor & Destructor Documentation

5.11.2.1 PopupSaveWindow()

```
PopupSaveWindow::PopupSaveWindow (
            QWidget * parent = nullptr )  [explicit]
```

Construct a new Popup Save Window object.

Parameters

parent	The parent widget. Default is nullptr.

5.11.2.2 ~PopupSaveWindow()

```
PopupSaveWindow::~PopupSaveWindow ( )
```

5.11.3 Member Function Documentation

5.11.3.1 getEnteredText()

```
QString PopupSaveWindow::getEnteredText ( )  [inline]
```

Get the entered text.

Returns

QString The entered text.

5.11.3.2 onOkClicked

```
void PopupSaveWindow::onOkClicked ( )  [private], [slot]
```

Slot to handle the ok button click event.

Returns

void

5.11.4 Member Data Documentation

5.11.4.1 enteredText

```
QString PopupSaveWindow::enteredText  [private]
```

The entered text.

5.11.4.2 lineEdit

```
QLineEdit* PopupSaveWindow::lineEdit  [private]
```

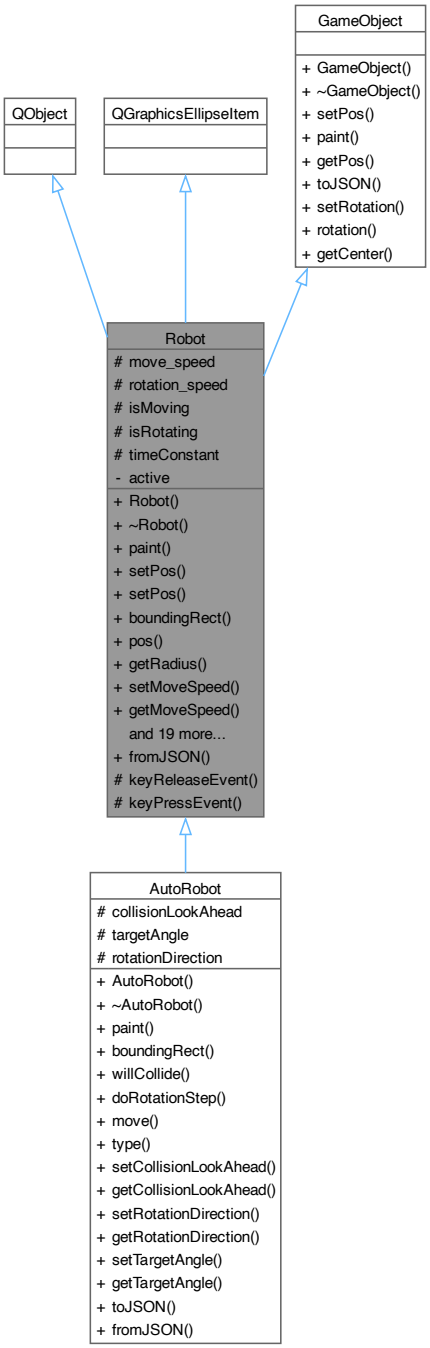
The line edit widget.

5.12 Robot Class Reference

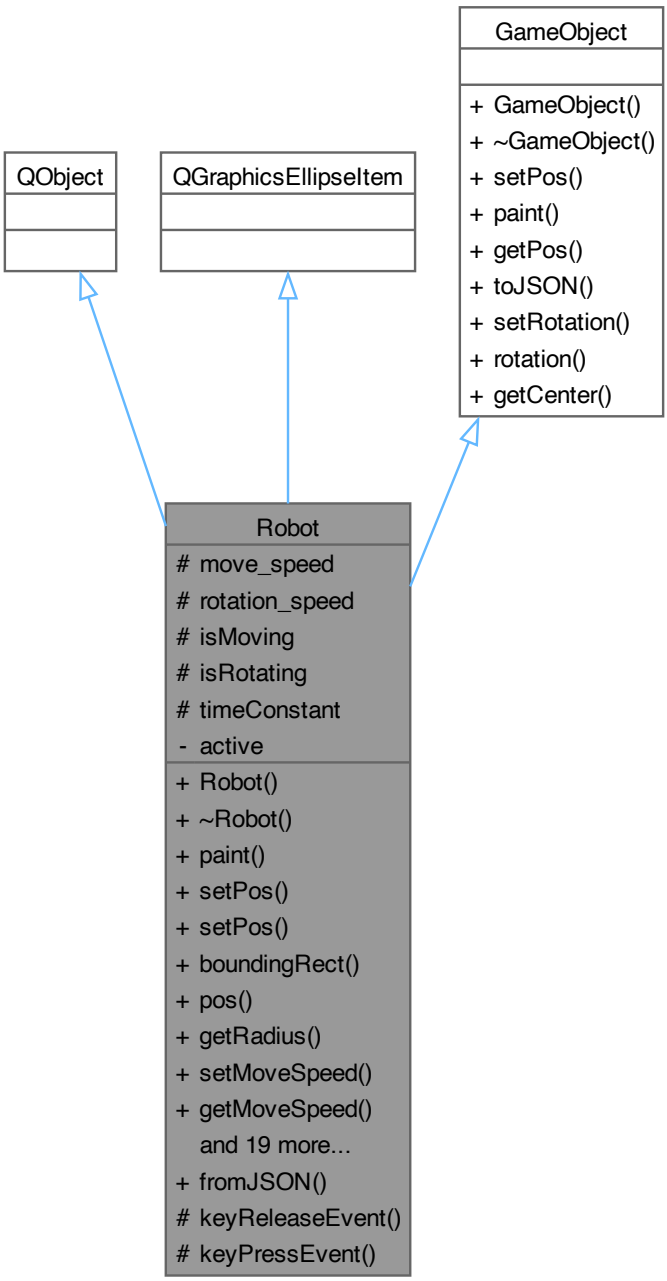
A class to represent a robot in the simulation. By default, the robot is a circle with a line drawn to represent its direction.

```
#include <robot.hpp>
```

Inheritance diagram for Robot:



Collaboration diagram for Robot:



Public Types

- enum RotationDirection { Left = -1 , None = 0 , Right = 1 }

  Enum to represent the direction of rotation of the robot.
- enum { Type = QGraphicsItem::UserType + 1 }

Signals

- void paramsUpdated ()

  Signal emitted when the parameters of the robot are updated.
- void robotSepuku ()

  Signal emitted when the robot is removed.

Public Member Functions

- Robot (QGraphicsItem *parent=nullptr, qreal *timeConstant=nullptr)

  Default constructor.
- ~Robot ()
- virtual void paint (QPainter *painter, const QStyleOptionGraphicsItem *option, QWidget *widget) override
- void setPos (const QPointF &pos)
- void setPos (qreal x, qreal y) override
- virtual QRectF boundingRect () const override
- QPointF pos ()
- qreal getRadius () const
- void setMoveSpeed (qreal speed)

  Set the move speed of the robot.
- qreal getMoveSpeed ()

  Get the move speed of the robot.
- void setRotationSpeed (qreal speed)

  Set the rotation speed of the robot.
- qreal getRotationSpeed ()

  Get the rotation speed of the robot.
- void startMoving ()

  Allow the robot to be moved by setting the isMoving flag to true.
- void stopMoving ()

  Stop the robot from moving by setting the isMoving flag to false.
- void startRotating (RotationDirection direction)

  Start rotating the robot in the given direction.
- void stopRotating ()

  Stop the robot from rotating by setting the isRotating flag to None.
- QPointF getDirectionVector ()

  Get the direction vector of the robot.
- virtual bool willCollide (QPointF directionVector, qreal magnitude, bool allowAnticollision=false)

  Check if the robot will collide with any other item in the scene or the scene boundaries if it moves by the given vector.
- virtual bool move ()

  Move the robot based on its current direction and speed. Returns true if the robot moved, false if it didn't (e.g. if it hit a boundary).
- int type () const override

  Get the type of the robot.
- QPointF getPos () override

  Get the position of the robot.
- virtual QJsonObject toJSON () override

  Convert the robot to a JSON object.
- void toggleActive ()

  Toggle the active state of the robot.
- bool isActive ()

  Check if the robot is active.

- qreal getAngle ()

  Get the angle of the robot.
- void setRadius (qreal radius)

  Set the angle of the robot.
- QPointF getCenter () override

  Get the center of the robot.
- qreal rotation () override

  Get the time constant of the simulation.
- void setRotation (qreal angle) override

  Set the rotation of the robot.

Public Member Functions inherited from GameObject

- GameObject ()=default
- ~GameObject ()=default

Static Public Member Functions

- static Robot * fromJSON (const QJsonObject &object, qreal *timeConstant)

  Create a Robot object from a JSON object.

Protected Member Functions

- void keyReleaseEvent (QKeyEvent *event)

  The radius of the robot.
- void keyPressEvent (QKeyEvent *event)

  Overridden keyPressEvent method.

Protected Attributes

- qreal move_speed = 1

  The speed of the robot.
- qreal rotation_speed = 1

  The speed of the rotation of the robot.
- bool isMoving = false

  Flag to indicate if the robot is moving.
- RotationDirection isRotating = RotationDirection::None

  Flag to indicate the direction of rotation.
- qreal * timeConstant = nullptr

  The time constant of the simulation.

Private Attributes

- bool active = false

  Flag to indicate if the robot is active.

5.12.1 Detailed Description

A class to represent a robot in the simulation. By default, the robot is a circle with a line drawn to represent its direction.

5.12.2 Member Enumeration Documentation

5.12.2.1 anonymous enum

```
anonymous enum
```

Enumerator

Type	

5.12.2.2 RotationDirection

```
enum Robot::RotationDirection
```

Enum to represent the direction of rotation of the robot.

Enumerator

Left	
None	
Right	

5.12.3 Constructor & Destructor Documentation

5.12.3.1 Robot()

```
Robot::Robot (
            QGraphicsItem * parent = nullptr,
            qreal * timeConstant = nullptr )
```

Default constructor.

Parameters

parent	The parent QGraphicsItem.
timeConstant	The time constant of the simulation.

Returns

void

The time constant is used to calculate the speed of the robot.

5.12.3.2 ~Robot()

```
Robot::~Robot ( )
```

5.12.4 Member Function Documentation

5.12.4.1 boundingRect()

```
virtual QRectF Robot::boundingRect ( ) const  [override], [virtual]
```

Reimplemented in AutoRobot.

5.12.4.2 fromJSON()

```
static Robot * Robot::fromJSON (
            const QJsonObject & object,
            qreal * timeConstant )  [static]
```

Create a Robot object from a JSON object.

Parameters

object	The JSON object.
timeConstant	The time constant of the simulation.

Returns

Robot*

5.12.4.3 getAngle()

```
qreal Robot::getAngle ( )  [inline]
```

Get the angle of the robot.

Returns

qreal

5.12.4.4 getCenter()

```
QPointF Robot::getCenter ( )  [inline], [override], [virtual]
```

Get the center of the robot.

Returns

QPointF

Implements GameObject.

5.12.4.5 getDirectionVector()

```
QPointF Robot::getDirectionVector ( )
```

Get the direction vector of the robot.

Returns

`QPointF` - Normalized vector representing the direction of the robot on the x and y axes

5.12.4.6 getMoveSpeed()

```
qreal Robot::getMoveSpeed ( )
```

Get the move speed of the robot.

Returns

qreal

5.12.4.7 getPos()

```
QPointF Robot::getPos ( )  [override], [virtual]
```

Get the position of the robot.

Returns

QPointF

Implements GameObject.

5.12.4.8 getRadius()

```
qreal Robot::getRadius ( ) const
```

5.12.4.9 getRotationSpeed()

```
qreal Robot::getRotationSpeed ( )
```

Get the rotation speed of the robot.

Returns

qreal

5.12.4.10 isActive()

```
bool Robot::isActive ( )  [inline]
```

Check if the robot is active.

Returns

bool

5.12.4.11 keyPressEvent()

```
void Robot::keyPressEvent (
            QKeyEvent * event )  [protected]
```

Overridden keyPressEvent method.

This method is called when a key is pressed while the robot is focused.

Parameters

event	The key event.

Returns

void

5.12.4.12 keyReleaseEvent()

```
void Robot::keyReleaseEvent (
            QKeyEvent * event )  [protected]
```

The radius of the robot.

5.12.4.13 move()

```
virtual bool Robot::move ( )  [virtual]
```

Move the robot based on its current direction and speed. Returns true if the robot moved, false if it didn't (e.g. if it hit a boundary).

Returns

true

false

Reimplemented in AutoRobot.

5.12.4.14 paint()

```
virtual void Robot::paint (
            QPainter * painter,
            const QStyleOptionGraphicsItem * option,
            QWidget * widget )  [override], [virtual]
```

Override the paint method to draw a line showing the direction of the robot

Implements GameObject.

Reimplemented in AutoRobot.

5.12.4.15 paramsUpdated

```
void Robot::paramsUpdated ( )  [signal]
```

Signal emitted when the parameters of the robot are updated.

Returns

void

5.12.4.16 pos()

```
QPointF Robot::pos ( )
```

Override pos to adjust to center-based positioning

5.12.4.17 robotSepuku

```
void Robot::robotSepuku ( )  [signal]
```

Signal emitted when the robot is removed.

Returns

void

5.12.4.18 rotation()

```
qreal Robot::rotation ( )  [inline], [override], [virtual]
```

Get the time constant of the simulation.

Returns

qreal

Implements GameObject.

5.12.4.19 setMoveSpeed()

```
void Robot::setMoveSpeed (
            qreal speed )
```

Set the move speed of the robot.

Parameters

speed	

5.12.4.20 setPos() [1/2]

```
void Robot::setPos (
            const QPointF & pos )
```

Override setPos to adjust to center-based positioning

5.12.4.21 setPos() [2/2]

```
void Robot::setPos (
            qreal x,
            qreal y )  [override], [virtual]
```

Overload setPos to accept x and y coordinates

Implements GameObject.

5.12.4.22 setRadius()

```
void Robot::setRadius (
            qreal radius )
```

Set the angle of the robot.

Parameters

angle	The angle to set.

Returns

void

5.12.4.23 setRotation()

```
void Robot::setRotation (
            qreal angle )  [inline], [override], [virtual]
```

Set the rotation of the robot.

Parameters

angle	The angle to set.

Returns

void

Implements GameObject.

5.12.4.24 setRotationSpeed()

```
void Robot::setRotationSpeed (
            qreal speed )
```

Set the rotation speed of the robot.

Parameters

speed	

5.12.4.25 startMoving()

```
void Robot::startMoving ( )
```

Allow the robot to be moved by setting the isMoving flag to true.

5.12.4.26 startRotating()

```
void Robot::startRotating (
            RotationDirection direction )
```

Start rotating the robot in the given direction.

Parameters

direction	

5.12.4.27 stopMoving()

```
void Robot::stopMoving ( )
```

Stop the robot from moving by setting the isMoving flag to false.

5.12.4.28 stopRotating()

```
void Robot::stopRotating ( )
```

Stop the robot from rotating by setting the isRotating flag to None.

5.12.4.29 toggleActive()

```
void Robot::toggleActive ( )  [inline]
```

Toggle the active state of the robot.

If the robot is active, it will be drawn with a light gray fill. If it is inactive, it will be drawn with a transparent fill.

Returns

void

5.12.4.30 toJSON()

```
virtual QJsonObject Robot::toJSON ( )  [override], [virtual]
```

Convert the robot to a JSON object.

Returns

QJsonObject

Implements GameObject.

Reimplemented in AutoRobot.

5.12.4.31 type()

```
int Robot::type ( ) const  [inline], [override]
```

Get the type of the robot.

Returns

int

5.12.4.32 willCollide()

```
virtual bool Robot::willCollide (
            QPointF directionVector,
            qreal magnitude,
            bool allowAnticollision = false )  [virtual]
```

Check if the robot will collide with any other item in the scene or the scene boundaries if it moves by the given vector.

Parameters

moveVector	The vector by which the robot will move
allowAnticollision	Flag to indicate if anticollision is allowed

Returns

`true` - if the robot will collide; `false` - if the robot will not collide

Reimplemented in AutoRobot.

5.12.5 Member Data Documentation

5.12.5.1 active

```
bool Robot::active = false  [private]
```

Flag to indicate if the robot is active.

5.12.5.2 isMoving

```
bool Robot::isMoving = false  [protected]
```

Flag to indicate if the robot is moving.

5.12.5.3 isRotating

```
RotationDirection Robot::isRotating = RotationDirection::None  [protected]
```

Flag to indicate the direction of rotation.

5.12.5.4 move_speed

```
qreal Robot::move_speed = 1  [protected]
```

The speed of the robot.

5.12.5.5 rotation_speed

```
qreal Robot::rotation_speed = 1  [protected]
```

The speed of the rotation of the robot.

5.12.5.6 timeConstant

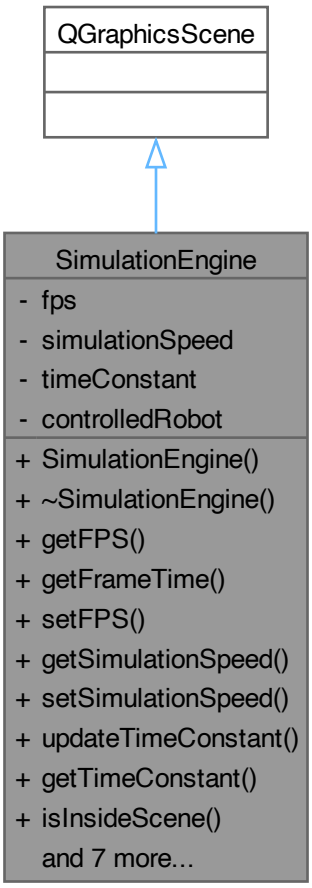
```
qreal* Robot::timeConstant = nullptr  [protected]
```

The time constant of the simulation.

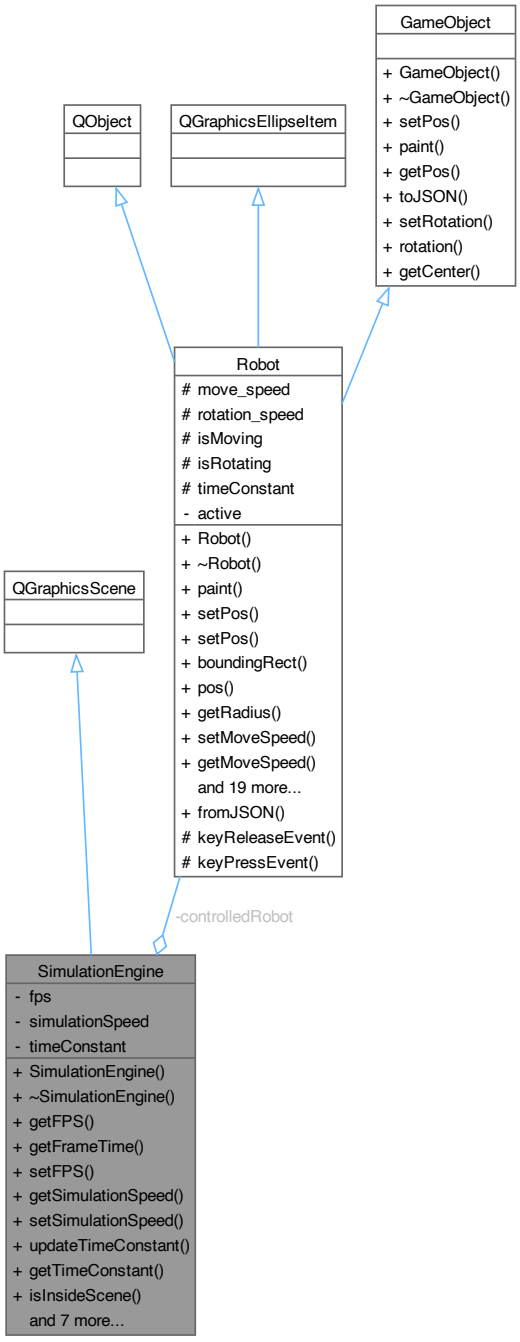
5.13 SimulationEngine Class Reference

`#include <simulationengine.hpp>`

Inheritance diagram for SimulationEngine:



Collaboration diagram for SimulationEngine:



Public Member Functions

- SimulationEngine (QObject *parent=nullptr, int fps=60, qreal simulationSpeed=1.0/16.0)
- ~SimulationEngine ()
- int getFPS ()

  Simulation Frames-Per-Second getter.
- int getFrameTime ()

Get the time it takes to render a single frame.

- void setFPS (int fps)

  Set the simulation Frames-Per-Second.
- qreal getSimulationSpeed ()

  Get the simulation speed.
- void setSimulationSpeed (qreal speed)

  Set the simulation speed.
- void updateTimeConstant ()

  Update the time constant.
- qreal * getTimeConstant ()

  Get the time constant pointer.
- bool isInsideScene (const QPointF &point) const

  Check if a point is inside the scene.
- Robot * getControlledRobot ()

  Get the robot that is currently being controlled.
- void setControlledRobot (Robot *robot)

  Set the robot that is currently being controlled.
- bool saveSimulation (const QString &filename="simulation")

  Save the simulation.
- bool loadSimulation (QString filename="simulation")

  Load the simulation.
- void read (const QJsonObject &json)

  Read the simulation from a JSON object.
- QJsonObject toJson () const

  Convert the simulation to a JSON object.
- void clearScene ()

  Clear the scene.

Private Attributes

- int fps = 60
- qreal simulationSpeed = 1
- qreal timeConstant = 1
- Robot * controlledRobot = nullptr

5.13.1 Constructor & Destructor Documentation

5.13.1.1 SimulationEngine()

```
SimulationEngine::SimulationEngine (
            QObject * parent = nullptr,
            int fps = 60,
            qreal simulationSpeed = 1.0/16.0 )
```

5.13.1.2 ~SimulationEngine()

```
SimulationEngine::~SimulationEngine ( )
```

5.13.2 Member Function Documentation

5.13.2.1 clearScene()

```
void SimulationEngine::clearScene ( )
```

Clear the scene.

5.13.2.2 getControlledRobot()

```
Robot * SimulationEngine::getControlledRobot ( )
```

Get the robot that is currently being controlled.

Returns

Robot∗

5.13.2.3 getFPS()

```
int SimulationEngine::getFPS ( )
```

Simulation Frames-Per-Second getter.

Returns

int

5.13.2.4 getFrameTime()

```
int SimulationEngine::getFrameTime ( )
```

Get the time it takes to render a single frame.

Returns

int

5.13.2.5 getSimulationSpeed()

```
qreal SimulationEngine::getSimulationSpeed ( )
```

Get the simulation speed.

Returns

qreal

5.13.2.6 getTimeConstant()

```
qreal * SimulationEngine::getTimeConstant ( )
```

Get the time constant pointer.

Returns

qreal*

5.13.2.7 isInsideScene()

```
bool SimulationEngine::isInsideScene (
            const QPointF & point ) const
```

Check if a point is inside the scene.

Parameters

point	

Returns

bool

5.13.2.8 loadSimulation()

```
bool SimulationEngine::loadSimulation (
            QString filename = "simulation" )
```

Load the simulation.

Parameters

filename	The name of the file to load the simulation from.

The file will be loaded from the JSON format from folders "simulations" and "exmaples"

Returns

void

5.13.2.9 read()

```
void SimulationEngine::read (
            const QJsonObject & json )
```

Read the simulation from a JSON object.

Parameters

json	The JSON object to read.

Returns

void

5.13.2.10 saveSimulation()

```
bool SimulationEngine::saveSimulation (
            const QString & filename = "simulation" )
```

Save the simulation.

Parameters

filename	The name of the file to save the simulation to.

The file will be saved in the JSON format in folder "simulations"

Returns

void

5.13.2.11 setControlledRobot()

```
void SimulationEngine::setControlledRobot (
            Robot * robot )
```

Set the robot that is currently being controlled.

Parameters

robot	

Returns

void

5.13.2.12 setFPS()

```
void SimulationEngine::setFPS (
            int fps )
```

Set the simulation Frames-Per-Second.

Parameters

fps	

5.13.2.13 setSimulationSpeed()

```
void SimulationEngine::setSimulationSpeed (
            qreal speed )
```

Set the simulation speed.

Parameters

speed	

Returns

void

5.13.2.14 toJson()

```
QJsonObject SimulationEngine::toJson ( ) const
```

Convert the simulation to a JSON object.

Returns

QJsonObject

5.13.2.15 updateTimeConstant()

```
void SimulationEngine::updateTimeConstant ( )
```

Update the time constant.

Returns

void

5.13.3 Member Data Documentation

5.13.3.1 controlledRobot

```
Robot* SimulationEngine::controlledRobot = nullptr  [private]
```

The robot that is currently being controlled.

5.13.3.2 fps

```
int SimulationEngine::fps = 60  [private]
```

The frames per second of the simulation engine.

5.13.3.3 simulationSpeed

```
qreal SimulationEngine::simulationSpeed = 1  [private]
```

The speed of the simulation engine.

5.13.3.4 timeConstant

```
qreal SimulationEngine::timeConstant = 1  [private]
```

The time constant of the simulation engine.

Index