RoboSoccer Team C

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Namespace Documentation

5.1 ATTACKER_STATES Namespace Reference

Enumerations

- enum AttackerStates { ANTICIPATE, SHOOT }

5.1.1 Enumeration Type Documentation

5.1.1.1 enum ATTACKER_STATES::AttackerStates

Enumerator

ANTICIPATE

SHOOT

5.2 CLEARBALL_STATES Namespace Reference

Enumerations

- enum ClearBallStates {
  INIT, STOP_BALL, NEAR_GOAL, CLEAR,
  END }

5.2.1 Enumeration Type Documentation

5.2.1.1 enum CLEARBALL_STATES::ClearBallStates

Enumerator

INIT

STOP_BALL

NEAR_GOAL

CLEAR

END

5.3 DEBUG_STATES Namespace Reference

Enumerations

- enum DebugStates {
  NO_DEBUG, CRUISE, INTERCEPT, PENALTY,
  START, SHOOT, PREDICTION, REFEREE }

5.3.1 Enumeration Type Documentation

5.3.1.1 enum DEBUG_STATES::DebugStates

Enumerator

NO_DEBUG

CRUISE

INTERCEPT

PENALTY

START

SHOOT

PREDICTION

REFEREE

5.4 DEFENDER_STATES Namespace Reference

Enumerations

- enum DefenderStates {
  SUPPORT_GK, CLEAR_BALL, PASS_BALL, SHOOT_ON_GOAL,
  BLOCK_ENEMY, MOVE_ASIDE }

5.4.1 Enumeration Type Documentation

5.4.1.1 enum DEFENDER_STATES::DefenderStates

Enumerator

SUPPORT_GK

CLEAR_BALL

PASS_BALL

SHOOT_ON_GOAL

BLOCK_ENEMY

MOVE_ASIDE

5.5 GAMECONTROL_STATES Namespace Reference

Enumerations

- enum GameControlStates {
  REFEREE_INIT, BEFORE_KICK_OFF, KICK_OFF, BEFORE_PENALTY,
  PENALTY, PLAY_ON, PAUSE, TIME_OVER,
  DEBUG_CRUISE, DEBUG_INTERCEPT, DEBUG_SHOOT, DEBUG_PASSTO,
  ATTACKER_MODE, DEFENDER_MODE }

5.5.1 Enumeration Type Documentation

5.5.1.1 enum GAMECONTROL_STATES::GameControlStates

Enumerator

REFEREE_INIT

BEFORE_KICK_OFF

KICK_OFF

BEFORE_PENALTY

PENALTY

PLAY_ON

PAUSE

TIME_OVER

DEBUG_CRUISE

DEBUG_INTERCEPT

DEBUG_SHOOT

DEBUG_PASSTO

ATTACKER_MODE

DEFENDER_MODE

5.6 GOALKEEPER_KICK_STATES Namespace Reference

Enumerations

- enum GkKickState { PREPARE, SHOOT }

5.6.1 Enumeration Type Documentation

5.6.1.1 enum GOALKEEPER_KICK_STATES::GkKickState

Enumerator

PREPARE

SHOOT

5.7 GOALKEEPER_STATES Namespace Reference

Enumerations

- enum GoalyState { AUTO_HOLD_NOT_ACTIVE, AUTO_HOLD_ACTIVE, CLEAR_BALL, PENALTY }

5.7.1 Enumeration Type Documentation

5.7.1.1 enum GOALKEEPER_STATES::GoalyState

Enumerator

AUTO_HOLD_NOT_ACTIVE

AUTO_HOLD_ACTIVE

CLEAR_BALL

PENALTY

5.8 KICKOFF_STATES Namespace Reference

Enumerations

- enum ClearBallStates { PREPARE, PREPARE_KICKOFF, SHOOT }

5.8.1 Enumeration Type Documentation

5.8.1.1 enum KICKOFF_STATES::ClearBallStates

Enumerator

PREPARE

PREPARE_KICKOFF

SHOOT

5.9 PASSTO_STATES Namespace Reference

Enumerations

- enum PassToStates {
  INIT, GET_BEHIND_BALL, GET_ON_BALL_TARGET_LINE, PASS_BALL,
  END }

5.9.1 Enumeration Type Documentation

5.9.1.1 enum PASSTO_STATES::PassToStates

Enumerator

INIT

GET_BEHIND_BALL

GET_ON_BALL_TARGET_LINE

PASS_BALL

END

5.10 SHOOTBALL_STATES Namespace Reference

Enumerations

- enum ShootBallStates {
  INIT, GET_BEHIND_BALL, GET_ON_BALL_GOAL_LINE, SHOOT_BALL,
  KICK, END }

5.10.1 Enumeration Type Documentation

5.10.1.1 enum SHOOTBALL_STATES::ShootBallStates

Enumerator

INIT

GET_BEHIND_BALL

GET_ON_BALL_GOAL_LINE

SHOOT_BALL

KICK

END

5.11 STOPBALL_STATES Namespace Reference

Enumerations

- enum StopBallStates {
  INIT, NOT_MOVING_BALL, BEFORE_BALL, OVERTAKE_BALL,
  BLOCK_BALL, END }

5.11.1 Enumeration Type Documentation

5.11.1.1 enum STOPBALL_STATES::StopBallStates

Enumerator

INIT

NOT_MOVING_BALL

BEFORE_BALL

OVERTAKE_BALL

BLOCK_BALL

END

5.12 STRATEGIES Namespace Reference

Enumerations

- enum Strategies { OFFENSIVE, DEFENSIVE }

5.12.1 Enumeration Type Documentation

5.12.1.1 enum STRATEGIES::Strategies

Enumerator

OFFENSIVE

DEFENSIVE

5.13 SUPPORT_GK_STATES Namespace Reference

Enumerations

- enum SupportGkStates { SHORTEN_ANGLE, BLOCK, MOVE_AWAY }

5.13.1 Enumeration Type Documentation

5.13.1.1 enum SUPPORT_GK_STATES::SupportGkStates

Enumerator

SHORTEN_ANGLE

BLOCK

MOVE_AWAY

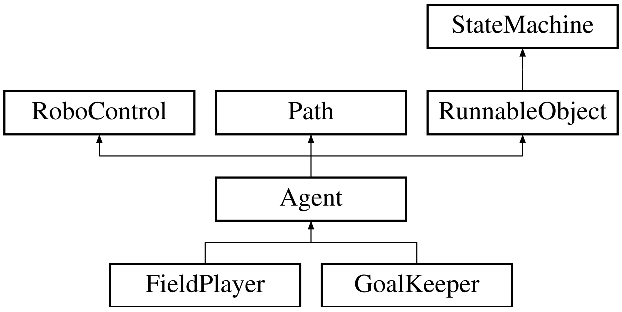
Chapter 6

Class Documentation

6.1 Agent Class Reference

```
#include <Agent.h>
```

Inheritance diagram for Agent:



Public Member Functions

- Agent (RTDBConn &DBC, const int deviceNr, Physics ∗physics, int initState, int interval)

  constructor for class Agent
- ∼Agent ()

  default destructor
- virtual void run ()=0

  runs state machine
- void update ()

  updates Timestamp of all agent functions
- void cruise ()

  moves the robot to its TargetPoint
- void activateCA (bool enemies, bool agents, bool ownPenaltyZone, bool enemyPenaltyZone, bool ballObst, bool gameField)

  activates Collisionavoidance for different params
- void deactivateCA ()

  deactivates Collisionavoidance
- bool turn (const TargetPoint &tp, bool precise=false)

  turns the robot to a given Vector or Targetpoint
- bool turn (const Vector2d &dir, double precision)
- void turn (const Vector2d &dir, bool precise=false)

- bool getDriveBackwards ()
- virtual void setSide (eSide s)=0

  set side of team
- void setTargetPoint (const TargetPoint &tp)

  sets a TargetPoint
- void setTargetPoint (const Position &tp)

  sets a TargetPoint
- void setTargetPoints (const std::vector< TargetPoint > &tp)

  set TargetPoints
- void setTargetPoints (const std::vector< Position > &tp)

  set TargetPoints
- void addTargetPoint (const TargetPoint &tp)

  adds a TargetPoint
- void addTargetPoint (const Position &tp)

  adds a TargetPoint
- void addTargetPoints (const std::vector< TargetPoint > &tp)

  adds TargetPoints
- void addTargetPoints (const std::vector< Position > &tp)

  adds TargetPoints
- void deleteTargetPoints ()

  delete all TargetPoints
- bool isAtTarget () const

  To check if robot has reached his TargetPoint.
- void activate ()

  Activates the drive function of the robot.
- void deactivate ()

  Deactivates the drive function of the robot.
- void startStopBall ()

  Robot stops the ball.
- void startClearBall ()

  If the ball is between roboter and our goal: Roboter overtakes the ball with collision avoidence. After that the roboter drives with full speed to the ball position. Otherwise: Roboter drives with fullspeed to ball position. Is cleared when ball direction is in enemy goal direction.
- void startShootBall ()

  Starts shooting the ball in goal direction.
- void stopAllActions ()

  Stop all actions of the robot.
- void startPassTo (Agent ∗agent)

  passes the ball to a roboter of our team
- Line getBallTargetLine (Position target)

  calculate a Ball to target line
- void setDesiredSpeed (double speed)

  sets a new drive speed
- Vector2d getPositionFiltered ()

  get the filtered position
- void shoot ()

  Shoot the ball in right direction.

Public Attributes

- const double ROBOT_RADIUS = 0.047

Protected Member Functions

- TargetPoint calcShootPosition (Position ball, Position target, double distToBall=0.1, bool brake=false)

  calculate shoot position depending on ball, target and distance to ball
- void shootBall ()

  moves behind ball and shoots it at the enemy goal
- bool isBehindBall (double val=0)

  checks if the robot is behind the ball
- void avoidPenaltyZone (TargetPoint ∗target)

  changes the targetpoint if it is in the enemypenaltyZone

Protected Attributes

- Timestamp lastPositionTimestamp_
- QTime timerAgent_
- QTime timerUpdate_
- double kp_ = 0.4
- double ki_ = 0.02
- double kd_ = 0.02
- double lastError = 0
- double speedIntegrated_ = 0
- double lastSpeed_ = 0
- boost::mutex targetPointMutex_
- Vector2d heading_
- Vector2d lastPosition_
- double robotSpeed_ = 0
- double desiredSpeed_ = 0.4
- bool driveBackwards
- bool active_
- eSide ourSide_
- bool useCA_ = true
- StateMachine shootBallSM
- bool attackerModeActive_ = false
- bool defenderModeActive_ = false
- bool shootBallActive_ = false
- bool kickOffActive_ = false
- bool penaltyModeActive_ = false
- Quadrangle ∗ ownCornerBottomLeft_
- Quadrangle ∗ ownCornerBottomRight_
- LineSegment ∗ ownGoalSegment_
- Quadrangle ∗ ownPenaltyZone_
- Quadrangle ∗ ownFieldHalf_
- LineSegment ∗ enemyGoalSegment_
- Quadrangle ∗ enemyPenaltyZone_
- Quadrangle ∗ enemyFieldHalf_
- Quadrangle ∗ leftSide_
- Quadrangle ∗ rightSide_

Friends

- class Debug

Additional Inherited Members

6.1.1 Constructor & Destructor Documentation

6.1.1.1 Agent::Agent (RTDBConn & *DBC,* const int *deviceNr,* Physics ∗ *physics,* int *initState,* int *interval*)

constructor for class Agent

Parameters

DBC	connection to camera
deviceNr	number of robot
physics	pointer to physics class
initState	initial state
interval	calculation interval

6.1.1.2 Agent::∼Agent ( )

default destructor

6.1.2 Member Function Documentation

6.1.2.1 void Agent::activate ( ) [inline]

Activates the drive function of the robot.

6.1.2.2 void Agent::activateCA (bool *enemies*, bool *agents*, bool *ownPenaltyZone*, bool *enemyPenaltyZone*, bool *ballObst*, bool *gameField*)

activates Collisionavoidance for different params

Parameters

activates	enemies
activates	agents
activates	ownPenaltyZone
activates	enemyPenaltyZone
activates	ball
activates	gameField

6.1.2.3 void Agent::addTargetPoint (const TargetPoint & *tp*)

adds a TargetPoint

6.1.2.4 void Agent::addTargetPoint (const Position & *tp*)

adds a TargetPoint

6.1.2.5 void Agent::addTargetPoints (const std::vector< TargetPoint > & *tp*)

adds TargetPoints

6.1.2.6 void Agent::addTargetPoints (const std::vector< Position > & *tp*)

adds TargetPoints

6.1.2.7 void Agent::avoidPenaltyZone (TargetPoint ∗ *target*) [protected]

changes the targetpoint if it is in the enemypenaltyZone

6.1.2.8 TargetPoint Agent::calcShootPosition (Position *ball,* Position *target,* double *distToBall =* 0.1*,* bool *brake =* false) [protected]

calculate shoot position depending on ball, target and distance to ball

6.1.2.9 void Agent::cruise ( )

moves the robot to its TargetPoint

6.1.2.10 void Agent::deactivate ( ) [inline]

Deactivates the drive function of the robot.

6.1.2.11 void Agent::deactivateCA ( ) [inline]

deactivates Collisionavoidance

6.1.2.12 void Agent::deleteTargetPoints ( ) [inline]

delete all TargetPoints

6.1.2.13 Line Agent::getBallTargetLine (Position *target*)

calculate a Ball to target line

Parameters

target	Position to which you want to shoot

6.1.2.14 bool Agent::getDriveBackwards ( ) [inline]

6.1.2.15 Vector2d Agent::getPositionFiltered ( ) [inline]

get the filtered position

Returns

filtered position of the robot

6.1.2.16 bool Agent::isAtTarget ( ) const

To check if robot has reached his TargetPoint.

Returns

bool: true: Robot has reached his final position, false: robot is still driving

6.1.2.17 bool Agent::isBehindBall (double *val =* 0) [protected]

checks if the robot is behind the ball

Parameters

val	Distance he should be behind the ball

6.1.2.18 virtual void Agent::run ( ) [pure virtual]

runs state machine

Implements RunnableObject.

Implemented in GoalKeeper, and FieldPlayer.

6.1.2.19 void Agent::setDesiredSpeed (double *speed*) [inline]

sets a new drive speed

Parameters

speed	speed with which the robot should drive

6.1.2.20 virtual void Agent::setSide (eSide *s*) [pure virtual]

set side of team

Implemented in FieldPlayer, and GoalKeeper.

6.1.2.21 void Agent::setTargetPoint (const TargetPoint & *tp*)

sets a TargetPoint

6.1.2.22 void Agent::setTargetPoint (const Position & *tp*)

sets a TargetPoint

6.1.2.23 void Agent::setTargetPoints (const std::vector< TargetPoint > & *tp*)

set TargetPoints

6.1.2.24 void Agent::setTargetPoints (const std::vector< Position > & *tp*)

set TargetPoints

6.1.2.25 void Agent::shoot ( )

Shoot the ball in right direction.

6.1.2.26 void Agent::shootBall ( ) [protected]

moves behind ball and shoots it at the enemy goal

6.1.2.27 void Agent::startClearBall ( )

If the ball is between roboter and our goal: Roboter overtakes the ball with collision avoidence. After that the roboter drives with full speed to the ball position. Otherwise: Roboter drives with fullspeed to ball position. Is cleared when ball direction is in enemy goal direction.

6.1.2.28 void Agent::startPassTo (Agent ∗ *agent*)

passes the ball to a roboter of our team

Parameters

agent	name of agent the ball shall be passed to

6.1.2.29 void Agent::startShootBall ( )

Starts shooting the ball in goal direction.

6.1.2.30 void Agent::startStopBall ( )

Robot stops the ball.

6.1.2.31 void Agent::stopAllActions ( )

Stop all actions of the robot.

6.1.2.32 bool Agent::turn (const TargetPoint & *tp*, bool *precise* = `false`)

turns the robot to a given Vector or Targetpoint

6.1.2.33 bool Agent::turn (const Vector2d & *dir*, double *precision*)

6.1.2.34 void Agent::turn (const Vector2d & *dir*, bool *precise* = `false`)

6.1.2.35 void Agent::update ( )

updates Timestamp of all agent functions

6.1.3 Friends And Related Function Documentation

6.1.3.1 friend class Debug `[friend]`

6.1.4 Member Data Documentation

6.1.4.1 bool Agent::active_ `[protected]`

robot cruise is active

6.1.4.2 bool Agent::attackerModeActive_ = false `[protected]`

status Atacker Mode

6.1.4.3 bool Agent::defenderModeActive_ = false [protected]

status Defender Mode

6.1.4.4 double Agent::desiredSpeed_ = 0.4 [protected]

desired robot speed

6.1.4.5 bool Agent::driveBackwards [protected]

robot is driving backwards

6.1.4.6 Quadrangle* Agent::enemyFieldHalf_ [protected]

Pointer to enemy field half

6.1.4.7 LineSegment* Agent::enemyGoalSegment_ [protected]

Pointer to enemy goal segment

6.1.4.8 Quadrangle* Agent::enemyPenaltyZone_ [protected]

Pointer to enemy penalty zone

6.1.4.9 Vector2d Agent::heading_ [protected]

heading of the robot

6.1.4.10 double Agent::kd_ = 0.02 [protected]

differential gain

6.1.4.11 double Agent::ki_ = 0.02 [protected]

integral gain

6.1.4.12 bool Agent::kickOffActive_ = false [protected]

status kickOff

6.1.4.13 double Agent::kp_ = 0.4 [protected]

proportional gain

6.1.4.14 double Agent::lastError = 0 [protected]

last deviation

6.1.4.15 Vector2d Agent::lastPosition_ [protected]

last robot position

6.1.4.16 Timestamp Agent::lastPositionTimestamp_ [protected]

time stamp of last position measurement

6.1.4.17 double Agent::lastSpeed_ = 0 [protected]

last speed of the robot

6.1.4.18 Quadrangle* Agent::leftSide_ [protected]

Pointer to lower half of the game field

6.1.4.19 eSide Agent::ourSide_ [protected]

our side

6.1.4.20 Quadrangle* Agent::ownCornerBottomLeft_ [protected]

Pointer to own corner bottomleft

6.1.4.21 Quadrangle* Agent::ownCornerBottomRight_ [protected]

pointer to own corner bottomright

6.1.4.22 Quadrangle* Agent::ownFieldHalf_ [protected]

Pointer to own field half

6.1.4.23 LineSegment* Agent::ownGoalSegment_ [protected]

Pointer to own goal segment

6.1.4.24 Quadrangle* Agent::ownPenaltyZone_ [protected]

Pointer to own penalty zone

6.1.4.25 bool Agent::penaltyModeActive_ = false [protected]

status penalty

6.1.4.26 Quadrangle* Agent::rightSide_ [protected]

Pointer to upper half of the game field

6.1.4.27 const double Agent::ROBOT_RADIUS = 0.047

robot radius

6.1.4.28 double Agent::robotSpeed_ = 0 [protected]

current robot speed

6.1.4.29 bool Agent::shootBallActive_ = false [protected]

status shootBall

6.1.4.30 StateMachine Agent::shootBallSM [protected]

6.1.4.31 double Agent::speedIntegrated_ = 0 [protected]

integrator counter

6.1.4.32 boost::mutex Agent::targetPointMutex_ [protected]

Mutex to lock targetPoints vector

6.1.4.33 QTime Agent::timerAgent_ [protected]

timeer for agent update

6.1.4.34 QTime Agent::timerUpdate_ [protected]

time update

6.1.4.35 bool Agent::useCA_ = true [protected]

use collision avoidance in general

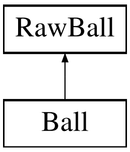
The documentation for this class was generated from the following files:

- lib/Agent.h
- src/Agent.cpp

6.2 Ball Class Reference

`#include <Ball.h>`

Inheritance diagram for Ball:



Public Member Functions

- Ball (RTDBConn &DBC)

  Constructor for Ball.
- Timestamp getLastTimestamp ()

  return the timestamp of last ball position update

6.2.1 Constructor & Destructor Documentation

6.2.1.1 Ball::Ball (RTDBConn & *DBC*) `[inline]`

Constructor for Ball.

6.2.2 Member Function Documentation

6.2.2.1 Timestamp Ball::getLastTimestamp ( ) `[inline]`

return the timestamp of last ball position update

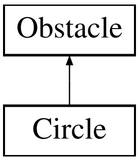
The documentation for this class was generated from the following file:

- lib/Ball.h

6.3 Circle Class Reference

```
#include <Circle.h>
```

Inheritance diagram for Circle:



Public Member Functions

- Circle ()

  default Constructor of Circle
- Circle (const Circle &circle)

  copy Constructor of Circle
- Circle (const Position &center, double r)

  Constructs a circle.
- Circle (const Vector2d &center, double r)

  Constructs a circle.
- double getRadius () const

  Getter for radius of Circle.
- virtual double getDistance (const Position &pos) const

  getter for distance of obstacle to position
- virtual bool isInside (const Position &pos) const

  determines if position is inside an obstacle

- virtual std::vector< Vector2d > getIntersection (const Line &line) const

  calculates intersection points between a line and an obstacle
- virtual std::vector< Vector2d > getIntersection (const LineSegment &seg) const

  calculates intersection points between a line segment and an obstacle
- virtual bool intersects (const Line &line) const

  determines if there is an intersection between a line and an obstacle
- virtual bool intersects (const LineSegment &seg) const

  determines if there is an intersection between a line segment and an obstacle
- virtual std::vector< Vector2d > getTangentPoints (const Position &pos) const

  calculates tangent points of an obstacle
- virtual Position getValidPosition (const Position &pos) const

  gets the closest valid position (position outside an obstacle)

Friends

- std::ostream & operator<< (std::ostream &os, const Circle &vec)

Additional Inherited Members

6.3.1 Constructor & Destructor Documentation

6.3.1.1 Circle::Circle ( )

default Constructor of Circle

6.3.1.2 Circle::Circle (const Circle & *circle*)

copy Constructor of Circle

6.3.1.3 Circle::Circle (const Position & *center,* double *r*)

Constructs a circle.

Parameters

center	New center of circle
r	New radius of circle

6.3.1.4 Circle::Circle (const Vector2d & *center,* double *r*)

Constructs a circle.

Parameters

center	New center of circle
r	New radius of circle

6.3.2 Member Function Documentation

6.3.2.1 double Circle::getDistance (const Position & *p*) const [virtual]

getter for distance of obstacle to position

Parameters

p	position

Implements Obstacle.

6.3.2.2 std::vector< Vector2d > Circle::getIntersection (const Line & *line*) const [virtual]

calculates intersection points between a line and an obstacle

Parameters

line	line

Implements Obstacle.

6.3.2.3 std::vector< Vector2d > Circle::getIntersection (const LineSegment & *seg*) const [virtual]

calculates intersection points between a line segment and an obstacle

Parameters

seg	line segment

Implements Obstacle.

6.3.2.4 double Circle::getRadius ( ) const [inline]

Getter for radius of Circle.

6.3.2.5 std::vector< Vector2d > Circle::getTangentPoints (const Position & *pos*) const [virtual]

calculates tangent points of an obstacle

Parameters

pos	point the tangents shall run through

Implements Obstacle.

6.3.2.6 Position Circle::getValidPosition (const Position & *pos*) const [virtual]

gets the closest valid position (position outside an obstacle)

Parameters

pos	old position that shall be checked and, if necessary, updated

Implements Obstacle.

6.3.2.7 bool Circle::intersects (const Line & *line*) const [virtual]

determines if there is an intersection between a line and an obstacle

Parameters

line	line

Implements Obstacle.

6.3.2.8 bool Circle::intersects (const LineSegment & *seg*) const [virtual]

determines if there is an intersection between a line segment and an obstacle

Parameters

seg	line segment

Implements Obstacle.

6.3.2.9 bool Circle::isInside (const Position & *p*) const [virtual]

determines if position is inside an obstacle

Parameters

p	position

Implements Obstacle.

6.3.3 Friends And Related Function Documentation

6.3.3.1 std::ostream& operator<< (std::ostream & *os*, const Circle & *vec*) [friend]

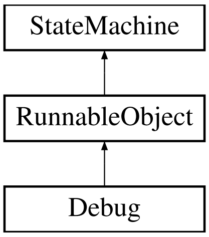
The documentation for this class was generated from the following files:

- helper/Circle.h
- helper/Circle.cpp

6.4 Debug Class Reference

`#include <Debug.h>`

Inheritance diagram for Debug:



Public Member Functions

- Debug (GameControl ∗gameControl)

  constructor for Debug class
- void run ()

  runs state machine

Friends

- class GameControl

  allows GameControl to access private fields of Debug class

Additional Inherited Members

6.4.1 Constructor & Destructor Documentation

6.4.1.1 Debug::Debug (GameControl ∗ *gameControl*)

constructor for Debug class

Parameters

gameControl	pointer to game control

6.4.2 Member Function Documentation

6.4.2.1 void Debug::run ( ) [virtual]

runs state machine

Implements RunnableObject.

6.4.3 Friends And Related Function Documentation

6.4.3.1 friend class GameControl [friend]

allows GameControl to access private fields of Debug class

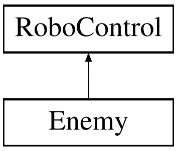
The documentation for this class was generated from the following files:

- lib/Debug.h
- src/Debug.cpp

6.5 Enemy Class Reference

```
#include <Enemy.h>
```

Inheritance diagram for Enemy:



Public Member Functions

- Enemy (RTDBConn &DBC, const int deviceNr, Physics ∗physics)

  constructor for class Enemy
- ∼Enemy ()

default destructor

- double getDistToBall ()

  calculate distance to ball

6.5.1 Constructor & Destructor Documentation

6.5.1.1 Enemy::Enemy (RTDBConn & *DBC*, const int *deviceNr*, Physics ∗ *physics*) [inline]

constructor for class Enemy

Parameters

DBC	connection to camera
deviceNr	number of robot

6.5.1.2 Enemy::∼Enemy ( ) [inline]

default destructor

6.5.2 Member Function Documentation

6.5.2.1 double Enemy::getDistToBall ( )

calculate distance to ball

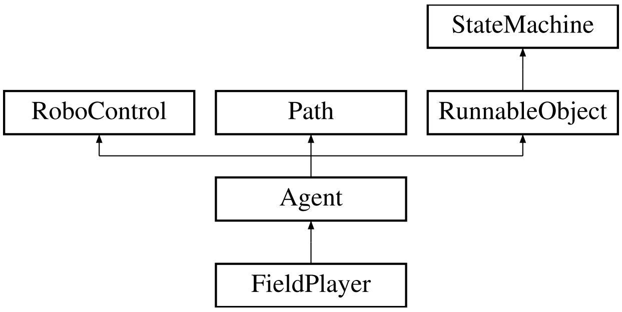
The documentation for this class was generated from the following files:

- lib/Enemy.h
- src/Enemy.cpp

6.6 FieldPlayer Class Reference

```
#include <FieldPlayer.h>
```

Inheritance diagram for FieldPlayer:



Public Member Functions

- FieldPlayer (RTDBConn &DBC, const int deviceNr, Physics ∗physics)

  constructor for class FieldPlayer
- ∼FieldPlayer ()

  default destructor

- void run ()

  runs the state machine
- void setSide (eSide s)

  sets the side of our team
- void startAttackerMode ()

  starts attacker mode
- void startDefenderMode (DefenderRole role)

  starts defender mode
- void startKickOff ()

  starts KickOff
- void setDefender (FieldPlayer ∗fp)

  set defender, setting attacker to null
- void setAttacker (FieldPlayer ∗fp)

  set attacker, setting defender to null
- void setKickoffPreparationTarget (TargetPoint tp)

  set a target point for kickoff preparation

Additional Inherited Members

6.6.1 Constructor & Destructor Documentation

6.6.1.1 FieldPlayer::FieldPlayer (RTDBConn & *DBC,* const int *deviceNr,* Physics ∗ *physics*)

constructor for class FieldPlayer

Parameters

DBC	connection to camera
deviceNr	number of robot
physics	pointer to physics class

6.6.1.2 FieldPlayer::∼FieldPlayer ( )

default destructor

6.6.2 Member Function Documentation

6.6.2.1 void FieldPlayer::run ( ) [virtual]

runs the state machine

Implements Agent.

6.6.2.2 void FieldPlayer::setAttacker (FieldPlayer ∗ *fp*) [inline]

set attacker, setting defender to null

6.6.2.3 void FieldPlayer::setDefender (FieldPlayer ∗ *fp*) [inline]

set defender, setting attacker to null

6.6.2.4 void FieldPlayer::setKickoffPreparationTarget (**TargetPoint** *tp*) [inline]

set a target point for kickoff preparation

6.6.2.5 void FieldPlayer::setSide (eSide *s*) [virtual]

sets the side of our team

Parameters

s	our side

Implements Agent.

6.6.2.6 void FieldPlayer::startAttackerMode ( )

starts attacker mode

6.6.2.7 void FieldPlayer::startDefenderMode (**DefenderRole** *role*)

starts defender mode

6.6.2.8 void FieldPlayer::startKickOff ( )

starts KickOff

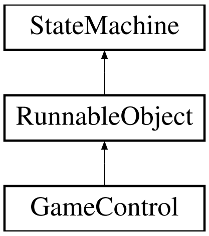
The documentation for this class was generated from the following files:

- lib/FieldPlayer.h
- src/FieldPlayer.cpp

6.7 GameControl Class Reference

`#include <GameControl.h>`

Inheritance diagram for GameControl:



Public Member Functions

- GameControl (Referee ∗ref, Physics ∗physics, eTeam colorT)

  constructor
- virtual void run ()

  runs state machine
- void setGoalKeeper (GoalKeeper ∗gk)

  sets goalkeeper as class member

- void setFieldPlayer1 (FieldPlayer ∗fp1)

  sets field player 1 as class member
- void setFieldPlayer2 (FieldPlayer ∗fp2)

  sets field player 2 as class member
- void setPermanentStrategy (STRATEGIES::Strategies strategy)

  chooses permanent predefined strategy

Friends

- class Debug

Additional Inherited Members

6.7.1 Constructor & Destructor Documentation

6.7.1.1 GameControl::GameControl (Referee ∗ *ref*, Physics ∗ *physics*, eTeam *colorT*)

constructor

Parameters

ref	pointer to referee
physics	pointer to physics
colorT	colour of our team

6.7.2 Member Function Documentation

6.7.2.1 void GameControl::run ( ) [virtual]

runs state machine

Implements RunnableObject.

6.7.2.2 void GameControl::setFieldPlayer1 (FieldPlayer ∗ *fp1*) [inline]

sets field player 1 as class member

Parameters

fp1	pointer to field player 1

6.7.2.3 void GameControl::setFieldPlayer2 (FieldPlayer ∗ *fp2*) [inline]

sets field player 2 as class member

Parameters

fp2	pointer to field player 2

6.7.2.4 void GameControl::setGoalKeeper (GoalKeeper ∗ *gk*) [inline]

sets goalkeeper as class member

Parameters

gk	pointer to goalkeeper

6.7.2.5 void GameControl::setPermanentStrategy (STRATEGIES::Strategies *strategy*)

chooses permanent predefined strategy

6.7.3 Friends And Related Function Documentation

6.7.3.1 friend class Debug [friend]

allows Debug to access private fields of GameControl

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

- lib/GameControl.h
- src/GameControl.cpp

6.8 Physics::GameField Struct Reference

```
#include <Physics.h>
```

Public Member Functions

- GameField (Quadrangle field, LineSegment goalLeft, LineSegment goalRight, LineSegment innerGoalLeft, LineSegment innerGoalRight, LineSegment halfwayLine, Quadrangle penaltyLeft, Quadrangle penaltyRight, Quadrangle obstaclePenaltyLeft, Quadrangle obstaclePenaltyRight, Quadrangle obstacleField, Quadrangle cornerBottomLeft, Quadrangle cornerBottomRight, Quadrangle cornerTopRight, Quadrangle cornerTopLeft, Quadrangle obstacleCornerBottomLeft, Quadrangle obstacleCornerBottomRight, Quadrangle obstacleCornerTopRight, Quadrangle obstacleCornerTopLeft, Quadrangle leftHalf, Quadrangle rightHalf, Quadrangle upperHalf, Quadrangle lowerHalf)

Public Attributes

- Quadrangle Field
- LineSegment GoalLeft
- LineSegment GoalRight
- LineSegment InnerGoalLeft
- LineSegment InnerGoalRight
- LineSegment HalfwayLine
- Quadrangle PenaltyAreaLeft
- Quadrangle PenaltyAreaRight
- Quadrangle ObstaclePenaltyAreaLeft
- Quadrangle ObstaclePenaltyAreaRight
- Quadrangle ObstacleField
- Quadrangle CornerBottomLeft
- Quadrangle CornerBottomRight
- Quadrangle CornerTopRight
- Quadrangle CornerTopLeft
- Quadrangle ObstacleCornerBottomLeft
- Quadrangle ObstacleCornerBottomRight

- Quadrangle ObstacleCornerTopRight
- Quadrangle ObstacleCornerTopLeft
- Quadrangle LeftHalf
- Quadrangle RightHalf
- Quadrangle UpperHalf
- Quadrangle LowerHalf

6.8.1 Constructor & Destructor Documentation

6.8.1.1 Physics::GameField::GameField (**Quadrangle** *field*, **LineSegment** *goalLeft*, **LineSegment** *goalRight*, **LineSegment** *innerGoalLeft*, **LineSegment** *innerGoalRight*, **LineSegment** *halfwayLine*, **Quadrangle** *penaltyLeft*, **Quadrangle** *penaltyRight*, **Quadrangle** *obstaclePenaltyLeft*, **Quadrangle** *obstaclePenaltyRight*, **Quadrangle** *obstacleField*, **Quadrangle** *cornerBottomLeft*, **Quadrangle** *cornerBottomRight*, **Quadrangle** *cornerTopRight*, **Quadrangle** *cornerTopLeft*, **Quadrangle** *obstacleCornerBottomLeft*, **Quadrangle** *obstacleCornerBottomRight*, **Quadrangle** *obstacleCornerTopRight*, **Quadrangle** *obstacleCornerTopLeft*, **Quadrangle** *leftHalf*, **Quadrangle** *rightHalf*, **Quadrangle** *upperHalf*, **Quadrangle** *lowerHalf*) `[inline]`

6.8.2 Member Data Documentation

6.8.2.1 Quadrangle Physics::GameField::CornerBottomLeft

6.8.2.2 Quadrangle Physics::GameField::CornerBottomRight

6.8.2.3 Quadrangle Physics::GameField::CornerTopLeft

6.8.2.4 Quadrangle Physics::GameField::CornerTopRight

6.8.2.5 Quadrangle Physics::GameField::Field

6.8.2.6 LineSegment Physics::GameField::GoalLeft

6.8.2.7 LineSegment Physics::GameField::GoalRight

6.8.2.8 LineSegment Physics::GameField::HalfwayLine

6.8.2.9 LineSegment Physics::GameField::InnerGoalLeft

6.8.2.10 LineSegment Physics::GameField::InnerGoalRight

6.8.2.11 Quadrangle Physics::GameField::LeftHalf

6.8.2.12 Quadrangle Physics::GameField::LowerHalf

6.8.2.13 Quadrangle Physics::GameField::ObstacleCornerBottomLeft

6.8.2.14 Quadrangle Physics::GameField::ObstacleCornerBottomRight

6.8.2.15 Quadrangle Physics::GameField::ObstacleCornerTopLeft

6.8.2.16 Quadrangle Physics::GameField::ObstacleCornerTopRight

6.8.2.17 Quadrangle Physics::GameField::ObstacleField

6.8.2.18 Quadrangle Physics::GameField::ObstaclePenaltyAreaLeft

6.8.2.19 Quadrangle Physics::GameField::ObstaclePenaltyAreaRight

6.8.2.20 Quadrangle Physics::GameField::PenaltyAreaLeft

6.8.2.21 Quadrangle Physics::GameField::PenaltyAreaRight

6.8.2.22 Quadrangle Physics::GameField::RightHalf

6.8.2.23 Quadrangle Physics::GameField::UpperHalf

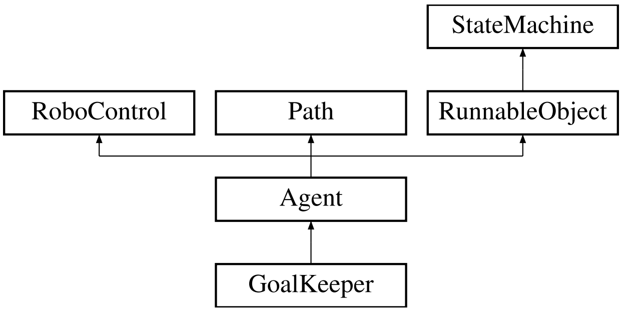
The documentation for this struct was generated from the following file:

- lib/Physics.h

6.9 GoalKeeper Class Reference

```
#include <GoalKeeper.h>
```

Inheritance diagram for GoalKeeper:



Public Member Functions

- GoalKeeper (RTDBConn &DBC, const int deviceNr, Physics ∗physics)

    constructor
- ∼GoalKeeper ()

    default destructor
- void setSide (eSide s)

    set side of goalkeeper's goal
- void startPenaltyMode ()

    starts penaly mode
- void startGoalKeeper ()

    starts goalkeeper
- void stopGoalKeeper ()

    stops goalkeeper
- void run ()

    runs state machine
- void setFirstDefender (FieldPlayer ∗fp)

    set the first defender
- void setSecondDefender (FieldPlayer ∗fp)

    set the second defender, setting attacker to null
- void setAttacker (FieldPlayer ∗fp)

    set attacker, setting defender to null

Additional Inherited Members

6.9.1 Constructor & Destructor Documentation

6.9.1.1 GoalKeeper::GoalKeeper (RTDBConn & *DBC,* const int *deviceNr,* Physics ∗ *physics*)

constructor

Parameters

DBC	connection to camera
deviceNr	number of roboter
physics	pointer to physics

6.9.1.2 GoalKeeper::∼GoalKeeper ( )

default destructor

6.9.2 Member Function Documentation

6.9.2.1 void GoalKeeper::run ( ) [virtual]

runs state machine

Implements Agent.

6.9.2.2 void GoalKeeper::setAttacker (FieldPlayer ∗ *fp*) [inline]

set attacker, setting defender to null

6.9.2.3 void GoalKeeper::setFirstDefender (FieldPlayer ∗ *fp*) [inline]

set the first defender

6.9.2.4 void GoalKeeper::setSecondDefender (FieldPlayer ∗ *fp*) [inline]

set the second defender, setting attacker to null

6.9.2.5 void GoalKeeper::setSide (eSide *s*) [virtual]

set side of goalkeeper’s goal

Parameters

s	side of our goal

Implements Agent.

6.9.2.6 void GoalKeeper::startGoalKeeper ( )

starts goalkeeper

6.9.2.7 void GoalKeeper::startPenaltyMode ( )

starts penaly mode

6.9.2.8 void GoalKeeper::stopGoalKeeper ( )

stops goalkeeper

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

- lib/GoalKeeper.h
- src/GoalKeeper.cpp

6.10 KdTree Class Reference

```
#include <KdTree.h>
```

Public Member Functions

- KdTree (const Vector2d &position, bool inObstacle)

  KdTree constructor.
- ∼KdTree ()

  KdTree deconstructor.
- Node ∗ insert (const Vector2d &position, bool inObstacle, const Node ∗previous)

  Inserts a new node into the tree.
- const Node ∗ nearest (const Vector2d &position) const

  Returns nearest node in tree to position argument.
- unsigned int depth () const

  Returns depth of tree.
- unsigned int nodeCount () const

  Returns number of nodes in tree.
- const Node ∗ root () const

  Returns root of tree.
- const Vector2d position (const Node ∗node) const

  Returns position of node.
- bool inObstacle (const Node ∗node) const

  Returns inObstacle attribute of node.
- const Node ∗ previous (const Node ∗node) const

  Returns predecessor node of node.
- const std::vector< const Node ∗ > getChildren () const

  Returns all children of root.

6.10.1 Constructor & Destructor Documentation

6.10.1.1 KdTree::KdTree (const Vector2d & *position*, bool *inObstacle*)

KdTree constructor.

Parameters

position	position of root node
inObstacle	root node inObstacle attribute

6.10.1.2 KdTree::∼KdTree ( )

KdTree deconstructor.

6.10.2 Member Function Documentation

6.10.2.1 unsigned int KdTree::depth ( ) const

Returns depth of tree.

6.10.2.2 const std::vector< const Node ∗ > KdTree::getChildren ( ) const

Returns all children of root.

6.10.2.3 bool KdTree::inObstacle (const Node ∗ *node*) const

Returns inObstacle attribute of node.

Parameters

	node: node to get inObstacle attribute from

6.10.2.4 Node ∗ KdTree::insert (const Vector2d & *position,* bool *inObstacle,* const Node ∗ *previous*)

Inserts a new node into the tree.

Parameters

position	new node position
inObstacle	new node inObstacle attribute
previous	predecessor of new node

6.10.2.5 const Node ∗ KdTree::nearest (const Vector2d & *position*) const

Returns nearest node in tree to position argument.

Parameters

position	position to find nearest node from

6.10.2.6 unsigned int KdTree::nodeCount ( ) const [inline]

Returns number of nodes in tree.

6.10.2.7 const Vector2d KdTree::position (const Node ∗ *node*) const

Returns position of node.

Parameters

	node: node to get position from

6.10.2.8 const Node ∗ KdTree::previous (const Node ∗ *node*) const

Returns predecessor node of node.

Parameters

	node: node to get predecessor

6.10.2.9 const Node∗ KdTree::root ( ) const `[inline]`

Returns root of tree.

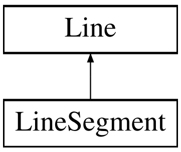
The documentation for this class was generated from the following files:

- helper/KdTree.h
- helper/KdTree.cpp

6.11 Line Class Reference

`#include <Line.h>`

Inheritance diagram for Line:



Public Member Functions

- Line ()

  default Constructor of Line
- Line (const Line &line)

  copy Constructor of Line
- Line (Position pos1, Position pos2)

  constructing a line using two positions
- Line (Position pos, double angle)

  constructing a line using positon and angle
- Line (Vector2d vec1, Vector2d vec2)

  constructing a line using two vectors
- Line (Vector2d vec, double angle)

  constructing a line using vector and angle
- Line (Position pos, Vector2d direction)

  constructing a line using a position and a direction vector
- double getDistance (const Position &pos) const

  getter for Distance of line to Position
- double getDistance (const Vector2d &vec) const

getter for Distance of line to vector
- bool isLeftOfLine (const Vector2d &vec) const

  Checks if position is left of line.
- bool isLeftOfLine (const Position &pos) const

  Checks if position is left of line.
- bool intersects (const Line &line) const

  Checks intesection: False if line is parallel, True else.
- Vector2d getSupportVector () const

  getter for support vector of line
- Vector2d getDirectionVector () const

  getter for direction vector of line
- Vector2d getNormalVector () const

  getter for normal vector of line (points left)
- void setSupportVector (const Vector2d &vec)

  sets support vector of line using a vector
- void setSupport (const Position &pos)

  sets support vector of line using a position
- void setDirectionVector (const Vector2d &vec)

  sets direction vector of line using a vector
- void setDirection (double phi)

  sets direction vector of line using an angle
- double getAngle (const Line &line) const

  getter for angle of line
- boost::optional< Vector2d > getIntersection (const Line &line) const

  calculates the Intesection of two lines
- Vector2d getClosestPoint (const Position &pos) const

  calculates the closest Point on the line to the given Position
- Vector2d getClosestPoint (const Vector2d &vec) const

  calculates the closest Point on the line to the given Vector
- Vector2d getReflection (const Line &line) const

  getter for reflection vector of line reflecting at a line segment

Protected Attributes

- Vector2d supportVector_
- Vector2d directionVector_
- Vector2d normalVector_

Friends

- std::ostream & operator<< (std::ostream &os, const Line &vec)

6.11.1 Constructor & Destructor Documentation

6.11.1.1 Line::Line ( )

default Constructor of Line

6.11.1.2 Line::Line (const Line & *line*)

copy Constructor of Line

6.11.1.3 Line::Line (Position *pos1,* Position *pos2*)

constructing a line using two positions

Parameters

pos1,2	Position 1,2

6.11.1.4 Line::Line (Position *pos*, double *angle*)

constructing a line using positon and angle

Parameters

pos	Position
angle	Angle

6.11.1.5 Line::Line (Vector2d *vec1*, Vector2d *vec2*)

constructing a line using two vectors

Parameters

vec1,2	Vector 1,2

6.11.1.6 Line::Line (Vector2d *vec*, double *angle*)

constructing a line using vector and angle

Parameters

vec	Vector
angle	Angle

6.11.1.7 Line::Line (Position *pos*, Vector2d *direction*)

constructing a line using a position and a direction vector

Parameters

pos	position vector
direction	direction vector

6.11.2 Member Function Documentation

6.11.2.1 double Line::getAngle (const Line & *line*) const `[inline]`

getter for angle of line

6.11.2.2 Vector2d Line::getClosestPoint (const Position & *pos*) const

calculates the closest Point on the line to the given Position

6.11.2.3 Vector2d Line::getClosestPoint (const Vector2d & *vec*) const

calculates the closest Point on the line to the given Vector

6.11.2.4 Vector2d Line::getDirectionVector ( ) const [inline]

getter for direction vector of line

6.11.2.5 double Line::getDistance (const Position & *pos*) const

getter for Distance of line to Position

6.11.2.6 double Line::getDistance (const Vector2d & *vec*) const

getter for Distance of line to vector

6.11.2.7 boost::optional< Vector2d > Line::getIntersection (const Line & *line*) const

calculates the Intesection of two lines

6.11.2.8 Vector2d Line::getNormalVector ( ) const [inline]

getter for normal vector of line (points left)

6.11.2.9 Vector2d Line::getReflection (const Line & *line*) const

getter for reflection vector of line reflecting at a line segment

6.11.2.10 Vector2d Line::getSupportVector ( ) const [inline]

getter for support vector of line

6.11.2.11 bool Line::intersects (const Line & *line*) const

Checks intesection: False if line is parallel, True else.

6.11.2.12 bool Line::isLeftOfLine (const Vector2d & *vec*) const

Checks if position is left of line.

6.11.2.13 bool Line::isLeftOfLine (const Position & *pos*) const

Checks if position is left of line.

6.11.2.14 void Line::setDirection (double *phi*) [inline]

sets direction vector of line using an angle

Parameters

phi	angle

6.11.2.15 void Line::setDirectionVector (const Vector2d & *vec*) [inline]

sets direction vector of line using a vector

Parameters

vec	Vector

6.11.2.16 void Line::setSupport (const Position & *pos*) [inline]

sets support vector of line using a position

Parameters

pos	Position

6.11.2.17 void Line::setSupportVector (const Vector2d & *vec*) [inline]

sets support vector of line using a vector

Parameters

vec	Vector

6.11.3 Friends And Related Function Documentation

6.11.3.1 std::ostream& operator<< (std::ostream & *os,* const Line & *vec*) [friend]

6.11.4 Member Data Documentation

6.11.4.1 Vector2d Line::directionVector_ [protected]

direction of the line, always normalized

6.11.4.2 Vector2d Line::normalVector_ [protected]

normal vector (orthogonal to directionVector), right-oriented

6.11.4.3 Vector2d Line::supportVector_ [protected]

support vector of the line

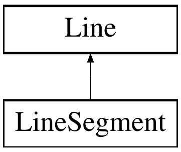
The documentation for this class was generated from the following files:

- helper/Line.h
- helper/Line.cpp

6.12 LineSegment Class Reference

```
#include <LineSegment.h>
```

Inheritance diagram for LineSegment:



Public Member Functions

- LineSegment ()

  default constructor of LineSegment
- LineSegment (const LineSegment &seg)

  copy constructor of LineSegment
- LineSegment (Position pos1, Position pos2)

  constructing a line segment using 2 positions
- LineSegment (Vector2d vec1, Vector2d vec2)

  constructing a line segment using 2 vectors
- LineSegment (Position pos, double angle, double length)

  constructing a line segment using position, angle and length
- LineSegment (Vector2d vec, double angle, double length)

  constructing a line segment using vector, angle and length
- double getDistanceExtended (Position pos) const

  calculates distance to line segment
- double getDistanceExtended (const Vector2d &vec) const
- bool isInSegmentArea (const Vector2d &vec) const
- bool intersects (const Line &line) const
- bool intersects (const LineSegment &line) const
- Position getStartPoint () const

  getter for starting point of the line segment
- Position getEndPoint () const

  getter for end point of the line segment
- Position getMiddlePoint () const

  getter for middle point of the line segment
- Vector2d getStartVector () const

  getter for start vector of the line segment
- Vector2d getEndVector () const

  getter for end vector of the line segment
- Vector2d getMiddleVector () const

  getter for middle vector of the line segment
- double getLength () const

  getter for the length of the line segment
- boost::optional< Vector2d > getIntersection (const Line &line) const

  getter for intersection of line segment and line
- boost::optional< Vector2d > getIntersection (const LineSegment &seg) const

  getter for intersection of two line segments
- Vector2d getClosestPoint (const Position &pos) const

  calculates the closest point on the line segment to the given Position
- Vector2d getClosestPoint (const Vector2d &vec) const

  calculates the closest point on the line segment to the given Vector

Friends

- std::ostream & operator<< (std::ostream &os, const LineSegment &vec)

Additional Inherited Members

6.12.1 Constructor & Destructor Documentation

6.12.1.1 LineSegment::LineSegment ( )

default constructor of LineSegment

6.12.1.2 LineSegment::LineSegment (const LineSegment & *seg*)

copy constructor of LineSegment

6.12.1.3 LineSegment::LineSegment (Position *pos1,* Position *pos2*)

constructing a line segment using 2 positions

Parameters

pos1	position 1
pos2	position 2

6.12.1.4 LineSegment::LineSegment (Vector2d *vec1,* Vector2d *vec2*)

constructing a line segment using 2 vectors

Parameters

vec1	vector 1,2

6.12.1.5 LineSegment::LineSegment (Position *pos,* double *angle,* double *length*)

constructing a line segment using position, angle and length

Parameters

pos	position
angle	angle
length	length

6.12.1.6 LineSegment::LineSegment (Vector2d *vec,* double *angle,* double *length*)

constructing a line segment using vector, angle and length

Parameters

vec	vector
angle	angle
length	length

6.12.2 Member Function Documentation

6.12.2.1 Vector2d LineSegment::getClosestPoint (const Position & *pos*) const

calculates the closest point on the line segment to the given Position

6.12.2.2 Vector2d LineSegment::getClosestPoint (const Vector2d & *vec*) const

calculates the closest point on the line segment to the given Vector

6.12.2.3 double LineSegment::getDistanceExtended (Position *pos*) const

calculates distance to line segment

Parameters

pos	position

6.12.2.4 double LineSegment::getDistanceExtended (const Vector2d & *vec*) const

6.12.2.5 Position LineSegment::getEndPoint ( ) const [inline]

getter for end point of the line segment

6.12.2.6 Vector2d LineSegment::getEndVector ( ) const [inline]

getter for end vector of the line segment

6.12.2.7 boost::optional< Vector2d > LineSegment::getIntersection (const Line & *line*) const

getter for intersection of line segment and line

6.12.2.8 boost::optional< Vector2d > LineSegment::getIntersection (const LineSegment & *seg*) const

getter for intersection of two line segments

6.12.2.9 double LineSegment::getLength ( ) const [inline]

getter for the length of the line segment

6.12.2.10 Position LineSegment::getMiddlePoint ( ) const [inline]

getter for middle point of the line segment

6.12.2.11 Vector2d LineSegment::getMiddleVector ( ) const [inline]

getter for middle vector of the line segment

6.12.2.12 Position LineSegment::getStartPoint ( ) const [inline]

getter for starting point of the line segment

6.12.2.13 Vector2d LineSegment::getStartVector ( ) const [inline]

getter for start vector of the line segment

6.12.2.14 bool LineSegment::intersects (const **Line** & *line*) const

6.12.2.15 bool LineSegment::intersects (const **LineSegment** & *line*) const

6.12.2.16 bool LineSegment::isInSegmentArea (const **Vector2d** & *vec*) const

6.12.3 Friends And Related Function Documentation

6.12.3.1 std::ostream& operator<< (std::ostream & *os*, const **LineSegment** & *vec*) `[friend]`

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

- helper/LineSegment.h
- helper/LineSegment.cpp

6.13 Node Class Reference

`#include <Node.h>`

Public Member Functions

- Node (const Vector2d &position, bool inObstacle, const Node ∗previous, unsigned int axis, Node ∗parent)

    Standard constructor for Node.
- ∼Node ()

    Deconstructor for Node.
- Node ∗∗ nearestChildPointer (const Vector2d &position)

    Returns pointer to nearest child to position.
- Node ∗ nearestChild (const Vector2d &position) const

    Return nearest child to position.
- Node ∗ farthestChild (const Vector2d &position) const

    Returns farthest child to position.
- const Vector2d & position () const

    Returns position of node.
- bool inObstacle () const

    Returns inObstacle attribute of node.
- const Node ∗ previous () const

    Returns predecessor node.
- unsigned int axis () const

    Returns dividing axis of node.
- Node ∗ parent () const

    Returns parent node.
- Node ∗ child (unsigned int index) const

    Returns child defined by index.
- unsigned int depth () const

    Returns depths of tree starting from this node.
- void getChildren (std::vector< const Node ∗ > &nodes)

    Returns all children of node.

6.13.1 Constructor & Destructor Documentation

6.13.1.1 Node::Node (const Vector2d & *position,* bool *inObstacle,* const Node ∗ *previous,* unsigned int *axis,* Node ∗ *parent*)

Standard constructor for Node.

Parameters

position	position of new node
inObstacle	inObstacle attribute of new node
previous	predecessor node of new node
axis	axis that new node divides
parent	parent node of new node

6.13.1.2 Node::∼Node ( )

Deconstructor for Node.

6.13.2 Member Function Documentation

6.13.2.1 unsigned int Node::axis ( ) const [inline]

Returns dividing axis of node.

6.13.2.2 Node∗ Node::child (unsigned int *index*) const [inline]

Returns child defined by index.

Parameters

index	index argument

6.13.2.3 unsigned int Node::depth ( ) const

Returns depths of tree starting from this node.

6.13.2.4 Node ∗ Node::farthestChild (const Vector2d & *position*) const

Returns farthest child to position.

Parameters

position	position argument

6.13.2.5 void Node::getChildren (std::vector< const Node ∗ > & *nodes*)

Returns all children of node.

Parameters

nodes	pointer to vector to save all children

6.13.2.6 bool Node::inObstacle ( ) const [inline]

Returns inObstacle attribute of node.

6.13.2.7 Node ∗ Node::nearestChild (const Vector2d & *position*) const

Return nearest child to position.

Parameters

position	position argument

6.13.2.8 Node ** Node::nearestChildPointer (const Vector2d & *position*)

Returns pointer to nearest child to position.

Parameters

position	position argument

6.13.2.9 Node* Node::parent ( ) const `[inline]`

Returns parent node.

6.13.2.10 const Vector2d& Node::position ( ) const `[inline]`

Returns position of node.

6.13.2.11 const Node* Node::previous ( ) const `[inline]`

Returns predecessor node.

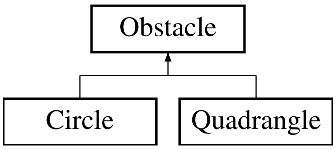
The documentation for this class was generated from the following files:

- helper/Node.h
- helper/Node.cpp

6.14 Obstacle Class Reference

`#include <Obstacle.h>`

Inheritance diagram for Obstacle:



Public Member Functions

- Obstacle ()

  default constructor of Obstacle
- Obstacle (const Obstacle &obst)

  copy constructor of Obstacle
- Obstacle (const Position &pos)

  constructing an obstacle using its position
- Obstacle (string name)

  constructing an obstacle using its name

- Obstacle (const Position &pos, string name)

  constructing an obstacle using its position and its name
- string getName () const

  getter for name of obstacle
- void setName (string name)

  sets name of obstacle
- virtual double getDistance (const Position &p) const =0

  getter for distance of obstacle to position
- virtual bool isInside (const Position &p) const =0

  determines if position is inside an obstacle
- virtual std::vector< Vector2d > getIntersection (const Line &line) const =0

  calculates intersection points between a line and an obstacle
- virtual std::vector< Vector2d > getIntersection (const LineSegment &seg) const =0

  calculates intersection points between a line segment and an obstacle
- virtual bool intersects (const Line &line) const =0

  determines if there is an intersection between a line and an obstacle
- virtual bool intersects (const LineSegment &seg) const =0

  determines if there is an intersection between a line segment and an obstacle
- void setCenter (const Position &pos)

  sets center of an obstacle
- void setCenter (const Vector2d &vec)

  sets center of an obstacle
- Position getCenter () const

  getter for center of an obstacle
- virtual std::vector< Vector2d > getTangentPoints (const Position &pos) const =0

  calculates tangent points of an obstacle
- virtual Position getValidPosition (const Position &pos) const =0

  gets the closest valid position (position outside an obstacle)

Protected Attributes

- Vector2d center_
- string name_

Friends

- std::ostream & operator<< (std::ostream &os, const Obstacle &vec)

6.14.1 Constructor & Destructor Documentation

6.14.1.1 Obstacle::Obstacle ( ) [inline]

default constructor of Obstacle

6.14.1.2 Obstacle::Obstacle (const Obstacle & *obst*) [inline]

copy constructor of Obstacle

6.14.1.3 Obstacle::Obstacle (const Position & *pos*) [inline]

constructing an obstacle using its position

Parameters

pos	position as center of obstacle

6.14.1.4 Obstacle::Obstacle (string *name*) [inline]

constructing an obstacle using its name

Parameters

name	name of obstacle

6.14.1.5 Obstacle::Obstacle (const Position & *pos*, string *name*) [inline]

constructing an obstacle using its position and its name

Parameters

pos	position as center of obstacle
name	name of obstacle

6.14.2 Member Function Documentation

6.14.2.1 Position Obstacle::getCenter ( ) const [inline]

getter for center of an obstacle

6.14.2.2 virtual double Obstacle::getDistance (const Position & *p*) const [pure virtual]

getter for distance of obstacle to position

Parameters

p	position

Implemented in Circle, and Quadrangle.

6.14.2.3 virtual std::vector< Vector2d > Obstacle::getIntersection (const Line & *line*) const [pure virtual]

calculates intersection points between a line and an obstacle

Parameters

line	line

Implemented in Circle, and Quadrangle.

6.14.2.4 virtual std::vector< Vector2d > Obstacle::getIntersection (const LineSegment & *seg*) const [pure virtual]

calculates intersection points between a line segment and an obstacle

Parameters

seg	line segment

Implemented in Circle, and Quadrangle.

6.14.2.5 string Obstacle::getName ( ) const [inline]

getter for name of obstacle

6.14.2.6 virtual std::vector< Vector2d > Obstacle::getTangentPoints (const Position & *pos*) const [pure virtual]

calculates tangent points of an obstacle

Parameters

pos	point the tangents shall run through

Implemented in Circle, and Quadrangle.

6.14.2.7 virtual Position Obstacle::getValidPosition (const Position & *pos*) const [pure virtual]

gets the closest valid position (position outside an obstacle)

Parameters

pos	old position that shall be checked and, if necessary, updated

Implemented in Circle, and Quadrangle.

6.14.2.8 virtual bool Obstacle::intersects (const Line & *line*) const [pure virtual]

determines if there is an intersection between a line and an obstacle

Parameters

line	line

Implemented in Circle, and Quadrangle.

6.14.2.9 virtual bool Obstacle::intersects (const LineSegment & *seg*) const [pure virtual]

determines if there is an intersection between a line segment and an obstacle

Parameters

seg	line segment

Implemented in Circle, and Quadrangle.

6.14.2.10 virtual bool Obstacle::isInside (const Position & *p*) const [pure virtual]

determines if position is inside an obstacle

Parameters

p	position

Implemented in Circle, and Quadrangle.

6.14.2.11 void Obstacle::setCenter (const Position & *pos*) [inline]

sets center of an obstacle

Parameters

pos	new center position

6.14.2.12 void Obstacle::setCenter (const Vector2d & *vec*) [inline]

sets center of an obstacle

Parameters

vec	new center position

6.14.2.13 void Obstacle::setName (string *name*) [inline]

sets name of obstacle

6.14.3 Friends And Related Function Documentation

6.14.3.1 std::ostream& operator<< (std::ostream & *os*, const Obstacle & *vec*) [friend]

6.14.4 Member Data Documentation

6.14.4.1 Vector2d Obstacle::center_ [protected]

center of obstacle

6.14.4.2 string Obstacle::name_ [protected]

name of obstacle

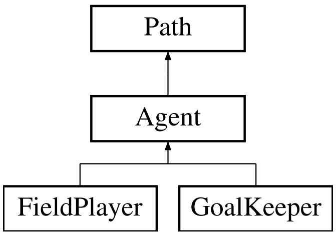
The documentation for this class was generated from the following file:

- helper/Obstacle.h

6.15 Path Class Reference

```
#include <Path.h>
```

Inheritance diagram for Path:



Public Member Functions

- Path (Physics ∗physics, int id)

    constructor of class Path
- ∼Path ()

    default destructor
- void compute (TargetPoint requestedEnd)

    computes path to target point
- void initializePath ()

    initializes path and obstacles
- int getId ()

    Getter for rfcomm id.

Protected Attributes

- Physics ∗ physics_
- std::vector< TargetPoint > targetPoints_
- std::vector< TargetPoint > CAtargetPoints_
- std::vector< TargetPoint > cachedCAtargetPoints_
- Vector2d position_
- int id_
- std::vector< Obstacle ∗ > obstacles_
- bool useGameField_ = true

6.15.1 Constructor & Destructor Documentation

6.15.1.1 Path::Path (**Physics** ∗ *physics,* int *id*)

constructor of class Path

Parameters

physics	pointer to physics
id	roboter ID

6.15.1.2 Path::∼Path ( )

default destructor

6.15.2 Member Function Documentation

6.15.2.1 void Path::compute (**TargetPoint** *requestedEnd*)

computes path to target point

Parameters

requestedEnd	desired target point

6.15.2.2 int Path::getId ( ) [inline]

Getter for rfcomm id.

6.15.2.3 void Path::initializePath ( )

initializes path and obstacles

6.15.3 Member Data Documentation

6.15.3.1 std::vector<TargetPoint> Path::cachedCAtargetPoints_ [protected]

vector of cached waypoints of collision avoidance trajectory

6.15.3.2 std::vector<TargetPoint> Path::CAtargetPoints_ [protected]

vector of waypoints of collision avoidance trajectory

6.15.3.3 int Path::id_ [protected]

roboter ID

6.15.3.4 std::vector<Obstacle*> Path::obstacles_ [protected]

vector of obstacles

6.15.3.5 Physics* Path::physics_ [protected]

pointer to physics

6.15.3.6 Vector2d Path::position_ [protected]

position

6.15.3.7 std::vector<TargetPoint> Path::targetPoints_ [protected]

vector of target points

6.15.3.8 bool Path::useGameField_ = true [protected]

Use Game Field Obstacle in collision avoidance

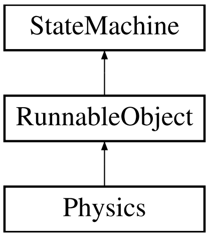
The documentation for this class was generated from the following files:

- lib/Path.h
- src/Path.cpp

6.16 Physics Class Reference

```
#include <Physics.h>
```

Inheritance diagram for Physics:



Classes

- struct GameField

Public Member Functions

- Physics ()

  default contructor
- Physics (Ball ∗ball)

  copy constructor
- void initializePhysics ()

  initializes obstacles
- void addAgent (Agent ∗ag)

  adds Agent
- void addEnemy (Enemy ∗em)

  adds Enemy
- Enemy ∗ getEnemy (int nr)

  returns enemy specified by argument
- Agent ∗ getAgent (int nr)

  returns agent specified by argument
- Ball ∗ getBall ()

  returns ball
- std::vector< Enemy ∗ > getEnemies ()

  returns all enemies as vector
- int getNumberOfAgents () const

  returns number of agents
- int getNumberOfEnemies () const

  returns number of enemies
- int getNumberOfPlayers () const

  returns number of robots in total
- bool isInsideGameField (Position const &pos) const

  checks if position is inside field
- bool isInsideLeftPenaltyArea (Position const &pos) const

  checks if position is inside left penalty area
- bool isInsideRightPenaltyArea (Position const &pos) const

  checks if position is inside right penalty area
- bool isInsidePenaltyArea (Position const &pos) const

checks if position is inside any penalty area

- bool isInsideLeftHalf (Position const &pos) const

  checks if position is inside left half
- bool isInsideRightHalf (Position const &pos) const

  checks if position is inside right half
- bool isInsideUpperHalf (Position const &pos) const

  checks if position is inside upper half
- bool isInsideLowerHalf (Position const &pos) const

  checks if position is inside lower half
- LineSegment getGoalLeft () const

  returns left goal line
- LineSegment getGoalRight () const

  returns right goal line
- LineSegment getInnerGoalLeft () const
- LineSegment getInnerGoalRight () const
- LineSegment getHalfwayLine () const
- Quadrangle getPenaltyAreaLeft () const

  returns left penalty area
- Quadrangle getPenaltyAreaRight () const

  returns right penalty area
- Quadrangle getObstaclePenaltyAreaLeft () const

  returns left penalty area with collision avoidance margin
- Quadrangle getObstaclePenaltyAreaRight () const

  returns right penalty area with collision avoidance margin
- Quadrangle getField () const

  returns game field
- Quadrangle getObstacleField () const

  returns game field with collision avoidance margin
- Quadrangle getCornerBottomLeft () const

  returns bottom left corner
- Quadrangle getCornerBottomRight () const

  returns bottom right corner
- Quadrangle getCornerTopRight () const

  returns top right corner
- Quadrangle getCornerTopLeft () const

  returns top left corner
- Quadrangle getObstacleCornerBottomLeft () const

  returns bottom left corner with collision avoidance margin
- Quadrangle getObstacleCornerBottomRight () const

  returns bottom right corner with collision avoidance margin
- Quadrangle getObstacleCornerTopRight () const

  returns top right corner with collision avoidance margin
- Quadrangle getObstacleCornerTopLeft () const

  returns top left corner with collision avoidance margin
- Quadrangle getLeftHalf () const

  returns left half of field
- Quadrangle getRightHalf () const

  returns right half of field
- Quadrangle getUpperHalf () const

  returns upper half of field
- Quadrangle getLowerHalf () const

returns lower half of field

- LineSegment ∗ getGoalLeftPtr ()

  returns pointer to left goal line
- LineSegment ∗ getGoalRightPtr ()
- LineSegment ∗ getInnerGoalLeftPtr ()
- LineSegment ∗ getInnerGoalRightPtr ()
- LineSegment ∗ getHalfwayLinePtr ()

  returns pointer to middle line
- Quadrangle ∗ getObstaclePenaltyAreaLeftPtr ()

  returns pointer to left penalty area with collision avoidance margin
- Quadrangle ∗ getObstaclePenaltyAreaRightPtr ()

  returns pointer to right penalty area with collision avoidance margin
- Quadrangle ∗ getFieldPtr ()

  returns pointer to game field
- Quadrangle ∗ getObstacleFieldPtr ()

  returns pointer to game field with collision avoidance margin
- Quadrangle ∗ getCornerBottomLeftPtr ()

  returns pointer to bottom left corner
- Quadrangle ∗ getCornerBottomRightPtr ()

  returns pointer to bottom right corner
- Quadrangle ∗ getCornerTopRightPtr ()

  returns pointer to top right corner
- Quadrangle ∗ getCornerTopLeftPtr ()

  returns pointer to top left corner
- Quadrangle ∗ getObstacleCornerBottomLeftPtr ()

  returns pointer to bottom left corner with collision avoidance margin
- Quadrangle ∗ getObstacleCornerBottomRightPtr ()

  returns pointer to bottom right corner with collision avoidance margin
- Quadrangle ∗ getObstacleCornerTopRightPtr ()

  returns pointer to top right corner with collision avoidance margin
- Quadrangle ∗ getObstacleCornerTopLeftPtr ()

  returns pointer to top left corner with collision avoidance margin
- Quadrangle ∗ getLeftHalfPtr ()

  returns pointer to left half of field
- Quadrangle ∗ getRightHalfPtr ()

  returns pointer to right half of field
- Quadrangle ∗ getUpperHalfPtr ()

  returns pointer to upper half of field
- Quadrangle ∗ getLowerHalfPtr ()

  returns pointer to lower half of field
- Obstacle ∗ getBallObstacle ()

  returns ball with collision avoidance margin
- std::vector< Obstacle ∗ > getAgentObstacles ()

  returns all agents with collision avoidance margin
- std::vector< Obstacle ∗ > getEnemyObstacles ()

  returns all enemies with collision avoidance margin
- Vector2d getBallPositionFiltered ()

  returns filtered ball position
- Position getBallLastPosition ()

  returns last ball position
- Position getPredBallPosition (int milliseconds) const

returns predicted ball position
- Vector2d getPredBallVelocity (int milliseconds) const

  returns predicted ball velocity
- Vector2d getBallVelocity () const

  returns current ball velocity
- std::vector< LineSegment > getBallTrajectory (int milliseconds) const

  returns predicted ball trajectory
- Enemy ∗ getEnemyClosestToBall ()

  returns enemy closest to ball
- double getClosestEnemysDistance (const Vector2d &vec) const

  returns distance to closest enemy from argument position
- double getClosestEnemysDistanceToBall () const

  returns distance to ball of enemy closest to ball
- void run ()

  main update routine of Physics
- void startComparePrediction (int predictionTime)

  start a prediction comparison to check prediction calculation
- void stopComparePrediction ()

  stop the prediction comparison

Public Attributes

- const double ROBOT_RADIUS = 0.047
- const double ROBOT_OBSTACLE_RADIUS = 3.5 ∗ ROBOT_RADIUS
- const double BALL_RADIUS = 0.021335
- const double BALL_OBSTACLE_RADIUS = BALL_RADIUS + 1.5 ∗ ROBOT_RADIUS
- const double PENALTY_AREA_MARGIN = 1.05 ∗ ROBOT_RADIUS
- const double FIELD_MARGIN = 1.2 ∗ ROBOT_RADIUS
- const double CORNER_MARGIN = 1.1 ∗ ROBOT_RADIUS

Additional Inherited Members

6.16.1 Constructor & Destructor Documentation

6.16.1.1 Physics::Physics ( )

default contructor

6.16.1.2 Physics::Physics (**Ball** ∗ *ball*)

copy constructor

Parameters

ball	initializes member ball_

6.16.2 Member Function Documentation

6.16.2.1 void Physics::addAgent (**Agent** ∗ *ag*)

adds Agent

Parameters

ag	Agent to be added

6.16.2.2 void Physics::addEnemy (Enemy ∗ *em*)

adds Enemy

Parameters

em	Enemy to be added

6.16.2.3 Agent∗ Physics::getAgent (int *nr*) [inline]

returns agent specified by argument

Parameters

nr	id of agent

6.16.2.4 std::vector<Obstacle∗> Physics::getAgentObstacles ( ) [inline]

returns all agents with collision avoidance margin

6.16.2.5 Ball∗ Physics::getBall ( ) [inline]

returns ball

6.16.2.6 Position Physics::getBallLastPosition ( ) [inline]

returns last ball position

6.16.2.7 Obstacle∗ Physics::getBallObstacle ( ) [inline]

returns ball with collision avoidance margin

6.16.2.8 Vector2d Physics::getBallPositionFiltered ( ) [inline]

returns filtered ball position

6.16.2.9 std::vector< LineSegment > Physics::getBallTrajectory (int *milliseconds*) const

returns predicted ball trajectory

Parameters

milliseconds	prediction time

6.16.2.10 Vector2d Physics::getBallVelocity ( ) const

returns current ball velocity

6.16.2.11 double Physics::getClosestEnemysDistance (const Vector2d & *vec*) const

returns distance to closest enemy from argument position

Parameters

vec	position to be checked

6.16.2.12 double Physics::getClosestEnemysDistanceToBall ( ) const

returns distance to ball of enemy closest to ball

6.16.2.13 Quadrangle Physics::getCornerBottomLeft ( ) const [inline]

returns bottom left corner

6.16.2.14 Quadrangle* Physics::getCornerBottomLeftPtr ( ) [inline]

returns pointer to bottom left corner

6.16.2.15 Quadrangle Physics::getCornerBottomRight ( ) const [inline]

returns bottom right corner

6.16.2.16 Quadrangle* Physics::getCornerBottomRightPtr ( ) [inline]

returns pointer to bottom right corner

6.16.2.17 Quadrangle Physics::getCornerTopLeft ( ) const [inline]

returns top left corner

6.16.2.18 Quadrangle* Physics::getCornerTopLeftPtr ( ) [inline]

returns pointer to top left corner

6.16.2.19 Quadrangle Physics::getCornerTopRight ( ) const [inline]

returns top right corner

6.16.2.20 Quadrangle* Physics::getCornerTopRightPtr ( ) [inline]

returns pointer to top right corner

6.16.2.21 std::vector<Enemy*> Physics::getEnemies ( ) [inline]

returns all enemies as vector

6.16.2.22 Enemy* Physics::getEnemy (int *nr*) [inline]

returns enemy specified by argument

Parameters

nr	id of enemy

6.16.2.23 Enemy ∗ Physics::getEnemyClosestToBall ( )

returns enemy closest to ball

6.16.2.24 std::vector<Obstacle∗> Physics::getEnemyObstacles ( ) [inline]

returns all enemies with collision avoidance margin

6.16.2.25 Quadrangle Physics::getField ( ) const [inline]

returns game field

6.16.2.26 Quadrangle∗ Physics::getFieldPtr ( ) [inline]

returns pointer to game field

6.16.2.27 LineSegment Physics::getGoalLeft ( ) const [inline]

returns left goal line

6.16.2.28 LineSegment∗ Physics::getGoalLeftPtr ( ) [inline]

returns pointer to left goal line

6.16.2.29 LineSegment Physics::getGoalRight ( ) const [inline]

returns right goal line

6.16.2.30 LineSegment∗ Physics::getGoalRightPtr ( ) [inline]

6.16.2.31 LineSegment Physics::getHalfwayLine ( ) const [inline]

6.16.2.32 LineSegment∗ Physics::getHalfwayLinePtr ( ) [inline]

returns pointer to middle line

6.16.2.33 LineSegment Physics::getInnerGoalLeft ( ) const [inline]

6.16.2.34 LineSegment∗ Physics::getInnerGoalLeftPtr ( ) [inline]

6.16.2.35 LineSegment Physics::getInnerGoalRight ( ) const [inline]

6.16.2.36 LineSegment∗ Physics::getInnerGoalRightPtr ( ) [inline]

6.16.2.37 Quadrangle Physics::getLeftHalf ( ) const [inline]

returns left half of field

6.16.2.38 Quadrangle∗ Physics::getLeftHalfPtr ( ) [inline]

returns pointer to left half of field

6.16.2.39 Quadrangle Physics::getLowerHalf ( ) const [inline]

returns lower half of field

6.16.2.40 Quadrangle∗ Physics::getLowerHalfPtr ( ) [inline]

returns pointer to lower half of field

6.16.2.41 int Physics::getNumberOfAgents ( ) const [inline]

returns number of agents

6.16.2.42 int Physics::getNumberOfEnemies ( ) const [inline]

returns number of enemies

6.16.2.43 int Physics::getNumberOfPlayers ( ) const [inline]

returns number of robots in total

6.16.2.44 Quadrangle Physics::getObstacleCornerBottomLeft ( ) const [inline]

returns bottom left corner with collision avoidance margin

6.16.2.45 Quadrangle∗ Physics::getObstacleCornerBottomLeftPtr ( ) [inline]

returns pointer to bottom left corner with collision avoidance margin

6.16.2.46 Quadrangle Physics::getObstacleCornerBottomRight ( ) const [inline]

returns bottom right corner with collision avoidance margin

6.16.2.47 Quadrangle∗ Physics::getObstacleCornerBottomRightPtr ( ) [inline]

returns pointer to bottom right corner with collision avoidance margin

6.16.2.48 Quadrangle Physics::getObstacleCornerTopLeft ( ) const [inline]

returns top left corner with collision avoidance margin

6.16.2.49 Quadrangle∗ Physics::getObstacleCornerTopLeftPtr ( ) [inline]

returns pointer to top left corner with collision avoidance margin

6.16.2.50 Quadrangle Physics::getObstacleCornerTopRight ( ) const [inline]

returns top right corner with collision avoidance margin

6.16.2.51 Quadrangle∗ Physics::getObstacleCornerTopRightPtr ( ) [inline]

returns pointer to top right corner with collision avoidance margin

6.16.2.52 Quadrangle Physics::getObstacleField ( ) const [inline]

returns game field with collision avoidance margin

6.16.2.53 Quadrangle∗ Physics::getObstacleFieldPtr ( ) [inline]

returns pointer to game field with collision avoidance margin

6.16.2.54 Quadrangle Physics::getObstaclePenaltyAreaLeft ( ) const [inline]

returns left penalty area with collision avoidance margin

6.16.2.55 Quadrangle∗ Physics::getObstaclePenaltyAreaLeftPtr ( ) [inline]

returns pointer to left penalty area with collision avoidance margin

6.16.2.56 Quadrangle Physics::getObstaclePenaltyAreaRight ( ) const [inline]

returns right penalty area with collision avoidance margin

6.16.2.57 Quadrangle∗ Physics::getObstaclePenaltyAreaRightPtr ( ) [inline]

returns pointer to right penalty area with collision avoidance margin

6.16.2.58 Quadrangle Physics::getPenaltyAreaLeft ( ) const [inline]

returns left penalty area

6.16.2.59 Quadrangle Physics::getPenaltyAreaRight ( ) const [inline]

returns right penalty area

6.16.2.60 Position Physics::getPredBallPosition (int *milliseconds*) const

returns predicted ball position

Parameters

milliseconds	prediction time

6.16.2.61 Vector2d Physics::getPredBallVelocity (int *milliseconds*) const

returns predicted ball velocity

Parameters

milliseconds	prediction time

6.16.2.62 Quadrangle Physics::getRightHalf ( ) const [inline]

returns right half of field

6.16.2.63 Quadrangle∗ Physics::getRightHalfPtr ( ) [inline]

returns pointer to right half of field

6.16.2.64 Quadrangle Physics::getUpperHalf ( ) const [inline]

returns upper half of field

6.16.2.65 Quadrangle∗ Physics::getUpperHalfPtr ( ) [inline]

returns pointer to upper half of field

6.16.2.66 void Physics::initializePhysics ( )

initializes obstacles

6.16.2.67 bool Physics::isInsideGameField (Position const & *pos*) const [inline]

checks if position is inside field

Parameters

pos	position to be checked

6.16.2.68 bool Physics::isInsideLeftHalf (Position const & *pos*) const [inline]

checks if position is inside left half

Parameters

pos	position to be checked

6.16.2.69 bool Physics::isInsideLeftPenaltyArea (Position const & *pos*) const [inline]

checks if position is inside left penalty area

Parameters

pos	position to be checked

6.16.2.70 bool Physics::isInsideLowerHalf (Position const & *pos*) const [inline]

checks if position is inside lower half

Parameters

pos	position to be checked

6.16.2.71 bool Physics::isInsidePenaltyArea (Position const & *pos*) const [inline]

checks if position is inside any penalty area

Parameters

pos	position to be checked

6.16.2.72 bool Physics::isInsideRightHalf (Position const & *pos*) const [inline]

checks if position is inside right half

Parameters

pos	position to be checked

6.16.2.73 bool Physics::isInsideRightPenaltyArea (Position const & *pos*) const [inline]

checks if position is inside right penalty area

Parameters

pos	position to be checked

6.16.2.74 bool Physics::isInsideUpperHalf (Position const & *pos*) const [inline]

checks if position is inside upper half

Parameters

pos	position to be checked

6.16.2.75 void Physics::run ( ) [virtual]

main update routine of Physics

Implements RunnableObject.

6.16.2.76 void Physics::startComparePrediction (int *predictionTime*)

start a prediction comparison to check prediction calculation

6.16.2.77 void Physics::stopComparePrediction ( ) [inline]

stop the prediction comparison

6.16.3 Member Data Documentation

6.16.3.1 const double Physics::BALL_OBSTACLE_RADIUS = BALL_RADIUS + 1.5 ∗ ROBOT_RADIUS

ball radius with collision avoidance margin

6.16.3.2 const double Physics::BALL_RADIUS = 0.021335

physical ball radius

6.16.3.3 const double Physics::CORNER_MARGIN = 1.1 ∗ ROBOT_RADIUS

collision avoidance margin for corners

6.16.3.4 const double Physics::FIELD_MARGIN = 1.2 ∗ ROBOT_RADIUS

collision avoidance margin for field

6.16.3.5 const double Physics::PENALTY_AREA_MARGIN = 1.05 ∗ ROBOT_RADIUS

collision avoidance margin for penalty areas

6.16.3.6 const double Physics::ROBOT_OBSTACLE_RADIUS = 3.5 ∗ ROBOT_RADIUS

robot radius with collision avoidance margin

6.16.3.7 const double Physics::ROBOT_RADIUS = 0.047

physical robot radius

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

- lib/Physics.h
- src/Physics.cpp

6.17 PointInfo Struct Reference

A struct storing information about a point on the ball trajectory. Stores Position, Time and Velocity.

```
#include <Trajectory.h>
```

Public Member Functions

- PointInfo ()
- PointInfo (Vector2d point, Vector2d velocity)
- PointInfo (Vector2d point, Vector2d velocity, int time)

Public Attributes

- Vector2d Point
- int Time
- Vector2d Velocity

6.17.1 Detailed Description

A struct storing information about a point on the ball trajectory. Stores Position, Time and Velocity.

6.17.2 Constructor & Destructor Documentation

6.17.2.1 PointInfo::PointInfo ( ) `[inline]`

6.17.2.2 PointInfo::PointInfo (Vector2d *point*, Vector2d *velocity*) `[inline]`

6.17.2.3 PointInfo::PointInfo (Vector2d *point*, Vector2d *velocity*, int *time*) `[inline]`

6.17.3 Member Data Documentation

6.17.3.1 Vector2d PointInfo::Point

6.17.3.2 int PointInfo::Time

6.17.3.3 Vector2d PointInfo::Velocity

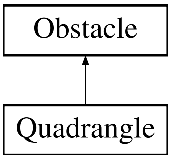
The documentation for this struct was generated from the following file:

- helper/Trajectory.h

6.18 Quadrangle Struct Reference

`#include <Quadrangle.h>`

Inheritance diagram for Quadrangle:



Public Member Functions

- Quadrangle (const Quadrangle &quad)

  Copy constructor of Quadrangle.
- Quadrangle (Position pos1, Position pos2, Position pos3, Position pos4)

  Constructing a Quadrangle using 4 Positions. Defined counter clockwise!
- virtual double getDistance (const Position &pos) const

  getter for distance of obstacle to position
- virtual bool isInside (const Position &pos) const

  determines if position is inside an obstacle
- std::vector< LineSegment > getSegments () const

  getter for line segments of a quadrangle
- virtual std::vector< Vector2d > getIntersection (const Line &line) const

  calculates intersection points between a line and an obstacle
- virtual std::vector< Vector2d > getIntersection (const LineSegment &seg) const

  calculates intersection points between a line segment and an obstacle

- virtual bool intersects (const Line &line) const

  determines if there is an intersection between a line and an obstacle
- virtual bool intersects (const LineSegment &seg) const

  determines if there is an intersection between a line segment and an obstacle
- virtual std::vector< Vector2d > getTangentPoints (const Position &pos) const

  calculates tangent points of an obstacle
- void setCenter (const Position &)
- virtual Position getValidPosition (const Position &pos) const

  gets the closest valid position (position outside an obstacle)

Friends

- std::ostream & operator<< (std::ostream &os, const Quadrangle &vec)

Additional Inherited Members

6.18.1 Constructor & Destructor Documentation

6.18.1.1 Quadrangle::Quadrangle (const Quadrangle & *quad*)

Copy constructor of Quadrangle.

6.18.1.2 Quadrangle::Quadrangle (Position *pos1,* Position *pos2,* Position *pos3,* Position *pos4*)

Constructing a Quadrangle using 4 Positions. Defined counter clockwise!

Parameters

pos1,...,pos4	Position 1 - 4

6.18.2 Member Function Documentation

6.18.2.1 double Quadrangle::getDistance (const Position & *p*) const [virtual]

getter for distance of obstacle to position

Parameters

p	position

Implements Obstacle.

6.18.2.2 std::vector< Vector2d > Quadrangle::getIntersection (const Line & *line*) const [virtual]

calculates intersection points between a line and an obstacle

Parameters

line	line

Implements Obstacle.

6.18.2.3 std::vector< Vector2d > Quadrangle::getIntersection (const LineSegment & *seg*) const [virtual]

calculates intersection points between a line segment and an obstacle

Parameters

seg	line segment

Implements Obstacle.

6.18.2.4 std::vector<**LineSegment**> Quadrangle::getSegments ( ) const [inline]

getter for line segments of a quadrangle

6.18.2.5 std::vector< **Vector2d** > Quadrangle::getTangentPoints (const Position & *pos*) const [virtual]

calculates tangent points of an obstacle

Parameters

pos	point the tangents shall run through

Implements Obstacle.

6.18.2.6 Position Quadrangle::getValidPosition (const Position & *pos*) const [virtual]

gets the closest valid position (position outside an obstacle)

Parameters

pos	old position that shall be checked and, if necessary, updated

Implements Obstacle.

6.18.2.7 bool Quadrangle::intersects (const **Line** & *line*) const [virtual]

determines if there is an intersection between a line and an obstacle

Parameters

line	line

Implements Obstacle.

6.18.2.8 bool Quadrangle::intersects (const **LineSegment** & *seg*) const [virtual]

determines if there is an intersection between a line segment and an obstacle

Parameters

seg	line segment

Implements Obstacle.

6.18.2.9 bool Quadrangle::isInside (const Position & *p*) const [virtual]

determines if position is inside an obstacle

Parameters

p	position

Implements Obstacle.

6.18.2.10 void Quadrangle::setCenter (const Position &) [inline]

6.18.3 Friends And Related Function Documentation

6.18.3.1 std::ostream& operator<< (std::ostream & *os*, const **Quadrangle** & *vec*) [friend]

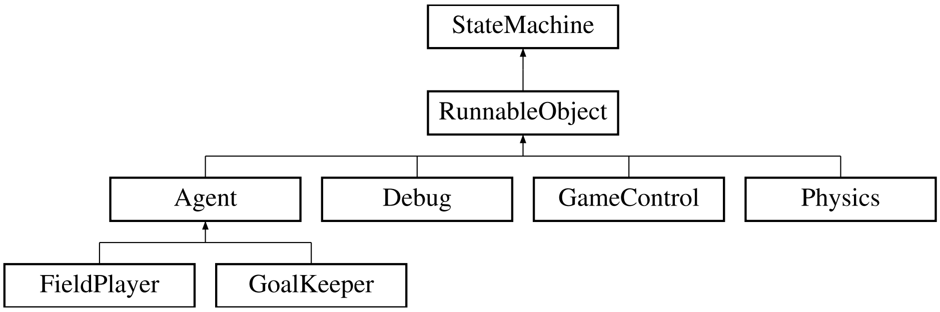
The documentation for this struct was generated from the following files:

- helper/Quadrangle.h
- helper/Quadrangle.cpp

6.19 RunnableObject Class Reference

```
#include <RunnableObject.h>
```

Inheritance diagram for RunnableObject:



Public Types

- enum RunStatus { RUN = 0, STOP = 1 }

Public Member Functions

- RunnableObject (int initState, int interval)

  Constructor for the runnable object.
- virtual void run ()=0

  run
- void stop ()

  stop run
- int getSleepTime ()

  calculate sleep time depending on calculation time
- void restartTimer ()

  *restart timer_*

Protected Attributes

- QTime timer_
- RunStatus status_
- time_t lastSchedule_
- bool noWarning_ = false

Additional Inherited Members

6.19.1 Member Enumeration Documentation

6.19.1.1 enum **RunnableObject::RunStatus**

Enumerator

RUN

STOP

6.19.2 Constructor & Destructor Documentation

6.19.2.1 RunnableObject::RunnableObject (int *initState,* int *interval*) [inline]

Constructor for the runnable object.

6.19.3 Member Function Documentation

6.19.3.1 int RunnableObject::getSleepTime ( ) [inline]

calculate sleep time depending on calculation time

6.19.3.2 void RunnableObject::restartTimer ( ) [inline]

restart timer_

6.19.3.3 virtual void RunnableObject::run ( ) [pure virtual]

run

Implemented in Physics, Agent, GoalKeeper, FieldPlayer, GameControl, and Debug.

6.19.3.4 void RunnableObject::stop ( ) [inline]

stop run

6.19.4 Member Data Documentation

6.19.4.1 time_t RunnableObject::lastSchedule_ [protected]

time of last schedule

6.19.4.2 bool RunnableObject::noWarning_ = false [protected]

remove warning for one execution of run()

6.19.4.3 RunStatus RunnableObject::status_ [protected]

status of the runnable object

6.19.4.4 QTime RunnableObject::timer_ [protected]

timer to time

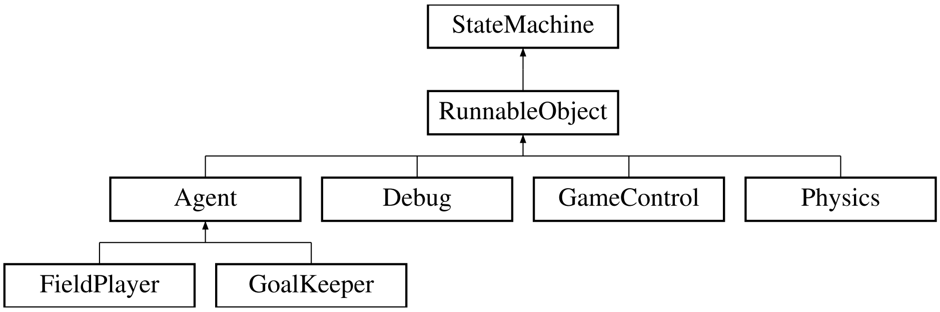
The documentation for this class was generated from the following file:

- lib/RunnableObject.h

6.20 StateMachine Class Reference

```
#include <StateMachine.h>
```

Inheritance diagram for StateMachine:



Public Member Functions

- StateMachine (int initState, int interval)

  Constructor for StateMachine.
- int getState ()

  get the current state of the StateMachine
- void changeState (int newState)

  change the state of the StateMachine setting the state change flag and resetting the timer
- bool after (int time_in_micros)

  returns true if there was no state change in time_in_micros
- void incTimer ()

  increment timer

Public Attributes

- int currentState_
- int lastState_
- bool stateChangeFlag_

Protected Attributes

- int interval_
- int timer_

6.20.1 Constructor & Destructor Documentation

6.20.1.1 StateMachine::StateMachine (int *initState,* int *interval*) [inline]

Constructor for StateMachine.

6.20.2 Member Function Documentation

6.20.2.1 bool StateMachine::after (int *time_in_micros*) [inline]

returns true if there was no state change in time_in_micros

6.20.2.2 void StateMachine::changeState (int *newState*) [inline]

change the state of the StateMachine setting the state change flag and resetting the timer

6.20.2.3 int StateMachine::getState ( ) [inline]

get the current state of the StateMachine

6.20.2.4 void StateMachine::incTimer ( ) [inline]

increment timer

6.20.3 Member Data Documentation

6.20.3.1 int StateMachine::currentState_

current state of the StateMachine

6.20.3.2 int StateMachine::interval_ [protected]

Statemachine interval

6.20.3.3 int StateMachine::lastState_

last state of the StateMachine

6.20.3.4 bool StateMachine::stateChangeFlag_

State change flag being set to true for one period

6.20.3.5 int StateMachine::timer_ [protected]

timer counting intervals

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

- lib/StateMachine.h

6.21 TargetPoint Struct Reference

defines target point and how it is supposed to be reached

`#include <Path.h>`

Public Member Functions

- TargetPoint ()

  standard constructor
- TargetPoint (Position pos, bool robBrake=true)

  constructor of target point with position
- TargetPoint (Position pos, Vector2d heading, bool robBrake=true)

  constructor of target point with position and heading
- TargetPoint (Position pos, double targetPrecision, bool robBrake=true)

  constructor of target point with position and precision
- TargetPoint (Position pos, Vector2d heading, double targetPrecision, bool robBrake=true)

  constructor of target point with position, heading and precision
- TargetPoint (Vector2d pos, bool robBrake=true)

  constructor of target point with position
- TargetPoint (Vector2d pos, Vector2d heading, bool robBrake=true)

  constructor of target point with position and heading
- TargetPoint (Vector2d pos, double targetPrecision, bool robBrake=true)

  constructor of target point with position and precision
- TargetPoint (Vector2d pos, Vector2d heading, double targetPrecision, bool robBrake=true)

  constructor of target point with position, heading and precision

Public Attributes

- Vector2d Location
- boost::optional< Vector2d > Heading
- double Precision = 0.1
- double AnglePrecision = deg2rad(5.)
- bool Brake = true

6.21.1 Detailed Description

defines target point and how it is supposed to be reached

6.21.2 Constructor & Destructor Documentation

6.21.2.1 TargetPoint::TargetPoint ( ) [inline]

standard constructor

6.21.2.2 TargetPoint::TargetPoint (Position *pos*, bool *robBrake* = true) [inline]

constructor of target point with position

Parameters

pos	target position
robBrake	braking active

6.21.2.3 TargetPoint::TargetPoint (Position *pos*, Vector2d *heading*, bool *robBrake* = `true`) `[inline]`

constructor of target point with position and heading

Parameters

pos	target position
heading	target heading
robBrake	braking active

6.21.2.4 TargetPoint::TargetPoint (Position *pos*, double *targetPrecision*, bool *robBrake* = `true`) `[inline]`

constructor of target point with position and precision

Parameters

pos	target position
targetPrecision	target precision
robBrake	braking active

6.21.2.5 TargetPoint::TargetPoint (Position *pos*, Vector2d *heading*, double *targetPrecision*, bool *robBrake* = `true`) `[inline]`

constructor of target point with position, heading and precision

Parameters

pos	target position
heading	target heading
targetPrecision	target precision
robBrake	braking active

6.21.2.6 TargetPoint::TargetPoint (Vector2d *pos*, bool *robBrake* = `true`) `[inline]`

constructor of target point with position

Parameters

pos	target position
robBrake	braking active

6.21.2.7 TargetPoint::TargetPoint (Vector2d *pos*, Vector2d *heading*, bool *robBrake* = `true`) `[inline]`

constructor of target point with position and heading

Parameters

pos	target position
heading	target heading
robBrake	braking active

6.21.2.8 TargetPoint::TargetPoint (Vector2d *pos*, double *targetPrecision*, bool *robBrake* = `true`) `[inline]`

constructor of target point with position and precision

Parameters

pos	target position
targetPrecision	target precision
robBrake	braking active

6.21.2.9 TargetPoint::TargetPoint (Vector2d *pos*, Vector2d *heading*, double *targetPrecision*, bool *robBrake* = `true`) `[inline]`

constructor of target point with position, heading and precision

Parameters

pos	target position
heading	target heading
targetPrecision	target precision
robBrake	braking active

6.21.3 Member Data Documentation

6.21.3.1 double TargetPoint::AnglePrecision = deg2rad(5.)

angle precision

6.21.3.2 bool TargetPoint::Brake = true

status if braking is activated

6.21.3.3 boost::optional<Vector2d> TargetPoint::Heading

optional heading direction

6.21.3.4 Vector2d TargetPoint::Location

position of target point

6.21.3.5 double TargetPoint::Precision = 0.1

precision

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

- lib/Path.h

6.22 Trajectory Class Reference

```
#include <Trajectory.h>
```

Public Member Functions

- Trajectory (Physics ∗physics)

  Constructor for Trajectory with a pointer to a physics instance.
- void updateTrajectory ()

  updates the whole ball trajectory
- Vector2d getPredictedBallPosition (int millis) const

  retrieves the predicted ball position after millis
- Vector2d getPredictedBallVelocity (int millis) const

  retrieves the predicted ball velocity after millis
- PointInfo getPredictedPointInfo (int millis) const

  retrieves the predicted ball PointInfo after millis
- std::vector< PointInfo > getBallTrajectory () const

  retrieves the whole ball Trajectory as calculated in updateTrajectory()
- void printTrajectory ()

  print the whole ball trajectory

6.22.1 Constructor & Destructor Documentation

6.22.1.1 Trajectory::Trajectory (**Physics** ∗ ***physics***) [inline]

Constructor for Trajectory with a pointer to a physics instance.

Parameters

physics	Pointer to physics instance

6.22.2 Member Function Documentation

6.22.2.1 std::vector< **PointInfo** > Trajectory::getBallTrajectory ( ) const

retrieves the whole ball Trajectory as calculated in updateTrajectory()

6.22.2.2 **Vector2d** Trajectory::getPredictedBallPosition (int ***millis***) const

retrieves the predicted ball position after millis

Parameters

millis	Milliseconds in the future

6.22.2.3 **Vector2d** Trajectory::getPredictedBallVelocity (int ***millis***) const

retrieves the predicted ball velocity after millis

Parameters

millis	Milliseconds in the future

6.22.2.4 PointInfo Trajectory::getPredictedPointInfo (int *millis*) const

retrieves the predicted ball PointInfo after millis

Parameters

millis	Milliseconds in the future

6.22.2.5 void Trajectory::printTrajectory ( )

print the whole ball trajectory

6.22.2.6 void Trajectory::updateTrajectory ( )

updates the whole ball trajectory

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

- helper/Trajectory.h
- helper/Trajectory.cpp

6.23 Vector2d Class Reference

```
#include <Vector2d.h>
```

Public Member Functions

- Vector2d ()

  Default constructor of Vector2d.
- Vector2d (const Vector2d &vec)

  Copy constructor of Vector2d.
- Vector2d (double newX, double newY)

  Constructing a Vector using coordinates.
- Vector2d (Position const &pos)

  Constructing a Vector using a position.
- Vector2d (double angle)

  Constructing a normalized Vector using an angle.
- double getLength () const

  Calculates length of the Vector.
- double getLengthSquared () const

  Calculates length squared of the Vector.
- double getDistance (const Vector2d &vec) const

  Calculates distance to another Vector.
- double getDistance (const Position &pos) const

  Calculates distance to a Position.
- double getAngle (const Vector2d &vec) const

  Calculates angle between this Vector and another one.

- double getAngle () const

  Calculates angle of this Vector.
- void normalize ()

  Normalizes the Vector.
- void turn (double rad)

  Turns the Vector by an angle [rad].
- Vector2d getNormalized () const

  Calculates normalized Vector in direction of this Vector.
- Vector2d getTurned (double rad) const

  Calculates turned Vector in mathmatical positive direction.
- Position toPosition () const

  Converts the Vector to a Position.
- Vector2d operator+ (Vector2d const &rhs) const

  Overwrites the + Operator.
- Vector2d operator- (Vector2d const &rhs) const

  Overwrites the - Operator.
- Vector2d operator∗ (double times) const

  Overwrites the ∗ Operator with a double value.
- Vector2d operator/ (double divide) const

  Overwrites the / Operator with a double value.
- double operator∗ (Vector2d const &rhs) const

  Overwrites the ∗ Operator with another Vector.
- double & operator[] (unsigned int index)
- double operator[] (unsigned int index) const

Public Attributes

- union {
  struct {
  double x
  double y
  }
  double d [2]
  };

Friends

- std::ostream & operator<< (std::ostream &os, const Vector2d &vec)
- std::ostream & operator<< (std::ostream &os, const std::vector< Vector2d > &vec)

6.23.1 Constructor & Destructor Documentation

6.23.1.1 Vector2d::Vector2d ( )

Default constructor of Vector2d.

6.23.1.2 Vector2d::Vector2d (const Vector2d & *vec*)

Copy constructor of Vector2d.

6.23.1.3 Vector2d::Vector2d (double *newX*, double *newY*)

Constructing a Vector using coordinates.

Parameters

newX	X coordinate of Vector
newY	Y coordinate of Vector

6.23.1.4 Vector2d::Vector2d (Position const & *pos*)

Constructing a Vector using a position.

Parameters

pos	Position to be turned to a Vector

6.23.1.5 Vector2d::Vector2d (double *angle*)

Constructing a normalized Vector using an angle.

Parameters

angle	angle of the new Vector

6.23.2 Member Function Documentation

6.23.2.1 double Vector2d::getAngle (const Vector2d & *vec*) const

Calculates angle between this Vector and another one.

Parameters

vec	Other Vector

Returns

Angle between Vectors [rad]

6.23.2.2 double Vector2d::getAngle ( ) const

Calculates angle of this Vector.

Returns

Returns angle of the Vector

6.23.2.3 double Vector2d::getDistance (const Vector2d & *vec*) const

Calculates distance to another Vector.

Parameters

vec	Other Vector

Returns

Distance

6.23.2.4 double Vector2d::getDistance (const Position & *pos*) const

Calculates distance to a Position.

Parameters

pos	Position

Returns

Distance

6.23.2.5 double Vector2d::getLength ( ) const

Calculates length of the Vector.

Returns

Length

6.23.2.6 double Vector2d::getLengthSquared ( ) const

Calculates length squared of the Vector.

Returns

Length Squared

6.23.2.7 Vector2d Vector2d::getNormalized ( ) const

Calculates normalized Vector in direction of this Vector.

Returns

The normalized Vector

6.23.2.8 Vector2d Vector2d::getTurned (double *rad*) const

Calculates turned Vector in mathmatical positive direction.

Returns

The turned Vector

6.23.2.9 void Vector2d::normalize ( )

Normalizes the Vector.

6.23.2.10 Vector2d Vector2d::operator$*$ (double *times*) const

Overwrites the $*$ Operator with a double value.

Parameters

times	Double value for operation

Returns

Scaled Vector

6.23.2.11 double Vector2d::operator∗ (Vector2d const & *rhs*) const

Overwrites the ∗ Operator with another Vector.

Parameters

rhs	Other Vector for dot-product

Returns

Scalar dot-product

6.23.2.12 Vector2d Vector2d::operator+ (Vector2d const & *rhs*) const

Overwrites the + Operator.

Parameters

rhs	Vector for operation

Returns

Added Vectors

6.23.2.13 Vector2d Vector2d::operator- (Vector2d const & *rhs*) const

Overwrites the - Operator.

Parameters

rhs	Vector for operation

Returns

Subtracted Vectors

6.23.2.14 Vector2d Vector2d::operator/ (double *divide*) const

Overwrites the / Operator with a double value.

Parameters

divide	Double value for operation

Returns

Scaled Vector

6.23.2.15 double & Vector2d::operator[ ] (unsigned int *index*)

6.23.2.16 double Vector2d::operator[ ] (unsigned int *index*) const

6.23.2.17 Position Vector2d::toPosition ( ) const

Converts the Vector to a Position.

Returns

The conversion

6.23.2.18 void Vector2d::turn (double *rad*)

Turns the Vector by an angle [rad].

Parameters

rad	Angle in radiant

6.23.3 Friends And Related Function Documentation

6.23.3.1 std::ostream& operator<< (std::ostream & *os,* const Vector2d & *vec*) [friend]

6.23.3.2 std::ostream& operator<< (std::ostream & *os,* const std::vector< Vector2d > & *vec*) [friend]

6.23.4 Member Data Documentation

6.23.4.1 union { ... }

6.23.4.2 double Vector2d::d[2]

6.23.4.3 double Vector2d::x

6.23.4.4 double Vector2d::y

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

- helper/Vector2d.h
- helper/Vector2d.cpp

Chapter 7

File Documentation

7.1 helper/Circle.cpp File Reference

```
#include "Circle.h"
```

Functions

- std::ostream & operator<< (std::ostream &os, const Circle &circle)

7.1.1 Function Documentation

7.1.1.1 std::ostream& operator<< (std::ostream & *os,* const Circle & *circle*)

7.2 helper/Circle.h File Reference

```
#include "Obstacle.h"
#include "Vector2d.h"
```

Classes

- class Circle

7.3 helper/KdTree.cpp File Reference

```
#include "KdTree.h"
```

7.4 helper/KdTree.h File Reference

```
#include "Node.h"
```

Classes

- class KdTree

7.5 helper/Line.cpp File Reference

```
#include "Line.h"
#include <iostream>
```

Functions

- std::ostream & operator<< (std::ostream &os, const Line &line)

7.5.1 Function Documentation

7.5.1.1 std::ostream& operator<< (std::ostream & *os,* const Line & *line*)

7.6 helper/Line.h File Reference

```
#include "Vector2d.h"
#include <boost/optional.hpp>
```

Classes

- class Line

7.7 helper/LineSegment.cpp File Reference

```
#include "LineSegment.h"
#include <math.h>
#include <iostream>
```

Functions

- std::ostream & operator<< (std::ostream &os, const LineSegment &seg)

7.7.1 Function Documentation

7.7.1.1 std::ostream& operator<< (std::ostream & *os,* const LineSegment & *seg*)

7.8 helper/LineSegment.h File Reference

```
#include "Line.h"
#include "Vector2d.h"
```

Classes

- class LineSegment

7.9 helper/Node.cpp File Reference

```
#include "Node.h"
```

7.10 helper/Node.h File Reference

```
#include "lib/Geometry.h"
```

Classes

- class Node

7.11 helper/Obstacle.cpp File Reference

```
#include "Obstacle.h"
```

Functions

- std::ostream & operator<< (std::ostream &os, const Obstacle &obst)

7.11.1 Function Documentation

7.11.1.1 std::ostream& operator<< (std::ostream & *os,* const Obstacle & *obst*)

7.12 helper/Obstacle.h File Reference

```
#include "Line.h"
#include "LineSegment.h"
#include "Vector2d.h"
#include <iostream>
```

Classes

- class Obstacle

7.13 helper/Quadrangle.cpp File Reference

```
#include "Quadrangle.h"
```

Functions

- std::ostream & operator<< (std::ostream &os, const Quadrangle &quad)

7.13.1 Function Documentation

7.13.1.1 std::ostream& operator<< (std::ostream & *os,* const Quadrangle & *quad*)

7.14 helper/Quadrangle.h File Reference

```
#include "Obstacle.h"
#include "LineSegment.h"
#include "Vector2d.h"
#include <vector>
```

Classes

- struct Quadrangle

7.15 helper/Trajectory.cpp File Reference

```
#include "Trajectory.h"
#include <math.h>
#include "lib/Physics.h"
#include <iomanip>
```

7.16 helper/Trajectory.h File Reference

```
#include "lib/Geometry.h"
#include <boost/thread/mutex.hpp>
```

Classes

- struct PointInfo

  A struct storing information about a point on the ball trajectory. Stores Position, Time and Velocity.
- class Trajectory

7.17 helper/Vector2d.cpp File Reference

```
#include "Vector2d.h"
#include <math.h>
#include <iostream>
```

Functions

- std::ostream & operator<< (std::ostream &os, const Vector2d &vec)
- std::ostream & operator<< (std::ostream &os, const std::vector< Vector2d > &vec)
- Vector2d operator- (const Position &pos1, const Position &pos2)

7.17.1 Function Documentation

7.17.1.1 Vector2d operator- (const Position & *pos1,* const Position & *pos2*)

7.17.1.2 std::ostream& operator<< (std::ostream & *os,* const Vector2d & *vec*)

7.17.1.3 std::ostream& operator<< (std::ostream & *os,* const std::vector< Vector2d > & *vec*)

7.18 helper/Vector2d.h File Reference

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

Classes

- class Vector2d

7.19 lib/Agent.h File Reference

```
#include "robo_control.h"
#include <vector>
#include "Path.h"
#include "RunnableObject.h"
#include <boost/optional.hpp>
#include <boost/thread/lock_guard.hpp>
#include <boost/thread/mutex.hpp>
#include "StateMachine.h"
#include <QTime>
```

Classes

- class Agent

Namespaces

- STOPBALL_STATES
- CLEARBALL_STATES
- SHOOTBALL_STATES
- PASSTO_STATES
- SUPPORT_GK_STATES

Enumerations

- enum STOPBALL_STATES::StopBallStates {
  STOPBALL_STATES::INIT, STOPBALL_STATES::NOT_MOVING_BALL, STOPBALL_STATES::BEFORE_BALL, STOPBALL_STATES::OVERTAKE_BALL,
  STOPBALL_STATES::BLOCK_BALL, STOPBALL_STATES::END }
- enum CLEARBALL_STATES::ClearBallStates {
  CLEARBALL_STATES::INIT, CLEARBALL_STATES::STOP_BALL, CLEARBALL_STATES::NEAR_GOAL, CLEARBALL_STATES::CLEAR,
  CLEARBALL_STATES::END }
- enum SHOOTBALL_STATES::ShootBallStates {
  SHOOTBALL_STATES::INIT, SHOOTBALL_STATES::GET_BEHIND_BALL, SHOOTBALL_STATES::GET_ON_BALL_GOAL_LINE, SHOOTBALL_STATES::SHOOT_BALL,
  SHOOTBALL_STATES::KICK, SHOOTBALL_STATES::END }
- enum PASSTO_STATES::PassToStates {
  PASSTO_STATES::INIT, PASSTO_STATES::GET_BEHIND_BALL, PASSTO_STATES::GET_ON_BALL_TARGET_LINE, PASSTO_STATES::PASS_BALL,
  PASSTO_STATES::END }
- enum SUPPORT_GK_STATES::SupportGkStates { SUPPORT_GK_STATES::SHORTEN_ANGLE, SUPPORT_GK_STATES::BLOCK, SUPPORT_GK_STATES::MOVE_AWAY }

7.20 lib/Ball.h File Reference

```
#include "raw_ball.h"
```

Classes

- class Ball

7.21 lib/Debug.h File Reference

```
#include "GameControl.h"
#include "RunnableObject.h"
```

Classes

- class Debug

Namespaces

- DEBUG_STATES

Enumerations

- enum DEBUG_STATES::DebugStates {
  DEBUG_STATES::NO_DEBUG, DEBUG_STATES::CRUISE, DEBUG_STATES::INTERCEPT, DEBUG_STATES::PENALTY,
  DEBUG_STATES::START, DEBUG_STATES::SHOOT, DEBUG_STATES::PREDICTION, DEBUG_STATES::REFEREE }

7.22 lib/Enemy.h File Reference

```
#include "robo_control.h"
```

Classes

- class Enemy

7.23 lib/FieldPlayer.h File Reference

```
#include "Agent.h"
#include "RunnableObject.h"
#include "Physics.h"
```

Classes

- class FieldPlayer

Namespaces

- ATTACKER_STATES
- DEFENDER_STATES
- KICKOFF_STATES

Enumerations

- enum DefenderRole { DEFEND_FRONT, DEFEND_BACK, DEFEND_ALONE }
- enum ATTACKER_STATES::AttackerStates { ATTACKER_STATES::ANTICIPATE, ATTACKER_STATES::SHOOT }
- enum DEFENDER_STATES::DefenderStates {
  DEFENDER_STATES::SUPPORT_GK, DEFENDER_STATES::CLEAR_BALL, DEFENDER_STATES::PASS_BALL, DEFENDER_STATES::SHOOT_ON_GOAL,
  DEFENDER_STATES::BLOCK_ENEMY, DEFENDER_STATES::MOVE_ASIDE }
- enum KICKOFF_STATES::ClearBallStates { KICKOFF_STATES::PREPARE, KICKOFF_STATES::PREPARE_KICKOFF, KICKOFF_STATES::SHOOT }

7.23.1 Enumeration Type Documentation

7.23.1.1 enum DefenderRole

Enumerator

DEFEND_FRONT

DEFEND_BACK

DEFEND_ALONE

7.24 lib/GameControl.h File Reference

```
#include "referee.h"
#include "Physics.h"
#include "GoalKeeper.h"
#include "FieldPlayer.h"
#include "thread"
```

Classes

- class GameControl

Namespaces

- GAMECONTROL_STATES
- STRATEGIES

Enumerations

- enum GAMECONTROL_STATES::GameControlStates {
GAMECONTROL_STATES::REFEREE_INIT, GAMECONTROL_STATES::BEFORE_KICK_OFF, GAMECONTROL_STATES::KICK_OFF, GAMECONTROL_STATES::BEFORE_PENALTY,
GAMECONTROL_STATES::PENALTY, GAMECONTROL_STATES::PLAY_ON, GAMECONTROL_STATES::PAUSE, GAMECONTROL_STATES::TIME_OVER,
GAMECONTROL_STATES::DEBUG_CRUISE, GAMECONTROL_STATES::DEBUG_INTERCEPT, GAMECONTROL_STATES::DEBUG_SHOOT, GAMECONTROL_STATES::DEBUG_PASSTO,
GAMECONTROL_STATES::ATTACKER_MODE, GAMECONTROL_STATES::DEFENDER_MODE }
- enum STRATEGIES::Strategies { STRATEGIES::OFFENSIVE, STRATEGIES::DEFENSIVE }

7.25 lib/Geometry.h File Reference

```
#include "helper/Vector2d.h"
#include "helper/Line.h"
#include "helper/LineSegment.h"
#include "helper/Obstacle.h"
#include "helper/Circle.h"
#include "helper/Quadrangle.h"
```

7.26 lib/GoalKeeper.h File Reference

```
#include "Agent.h"
#include "Physics.h"
#include "RunnableObject.h"
#include "FieldPlayer.h"
```

Classes

- class GoalKeeper

Namespaces

- GOALKEEPER_STATES
- GOALKEEPER_KICK_STATES

Enumerations

- enum GOALKEEPER_STATES::GoalyState { GOALKEEPER_STATES::AUTO_HOLD_NOT_ACTIVE, GOALKEEPER_STATES::AUTO_HOLD_ACTIVE, GOALKEEPER_STATES::CLEAR_BALL, GOALKEEPER_STATES::PENALTY }
- enum GOALKEEPER_KICK_STATES::GkKickState { GOALKEEPER_KICK_STATES::PREPARE, GOALKEEPER_KICK_STATES::SHOOT }

7.27 lib/Path.h File Reference

```
#include "list"
#include "Geometry.h"
#include "helper/KdTree.h"
#include <boost/optional.hpp>
```

Classes

- struct TargetPoint

  defines target point and how it is supposed to be reached
- class Path

7.28 lib/Physics.h File Reference

```
#include "Agent.h"
#include "Enemy.h"
#include "Ball.h"
#include "RunnableObject.h"
#include "Geometry.h"
#include "QTime"
#include "helper/Trajectory.h"
#include <boost/smart_ptr/shared_ptr.hpp>
#include <vector>
```

Classes

- class Physics
- struct Physics::GameField

Functions

- template<typename T >
  void movingAverage (T &value, T updatedValue, double factor=0.8)

  Performs a moving average filter on the value.

- template<typename T >
  void constraint (T &val, T minVal, T maxVal)

  Template to constrain a value. Enter min value first!!!

7.28.1 Function Documentation

7.28.1.1 template<typename T > void constraint (T & *val,* T *minVal,* T *maxVal*)

Template to constrain a value. Enter min value first!!!

Parameters

val	Value to be constraint
minVal	minimum Value
maxVal	maximum Value

7.28.1.2 template<typename T > void movingAverage (T & *value,* T *updatedValue,* double *factor* = `0.8`)

Performs a moving average filter on the value.

Parameters

value	Value to be filtered
updatedValue	new Value
factor	Factor for the new Value

7.29 lib/RunnableObject.h File Reference

```
#include <time.h>
#include "StateMachine.h"
#include <iostream>
#include <math.h>
#include <QTime>
```

Classes

- class RunnableObject

7.30 lib/StateMachine.h File Reference

Classes

- class StateMachine

Macros

- #define SM_DURING

  Macros to help with the usage of StateMachines.
- #define SM_EXIT
- #define SM_ENTRY

- #define SM_END
- #define SUBSM_DURING(a)

    Macros to help with the usage of subStatemachines.
- #define SUBSM_EXIT(a)
- #define SUBSM_ENTRY(a)
- #define SUBSM_END(a)

7.30.1 Macro Definition Documentation

7.30.1.1 #define SM_DURING

Value:

```
if (!stateChangeFlag_)\
                    {\
                    incTimer();\
                    switch (currentState_)\
                    {
```

Macros to help with the usage of StateMachines.

7.30.1.2 #define SM_END

Value:

```
default:\
                    break;\
                    }\
                    stateChangeFlag_ = false;\
                    }\
                    lastState_ = currentState_;
```

7.30.1.3 #define SM_ENTRY

Value:

```
default:\
                    break;\
                    }\
                    switch (currentState_)\
                    {
```

7.30.1.4 #define SM_EXIT

Value:

```
default:\
                    break;\
                    }\
                    }\
                    if (stateChangeFlag_)\
                    {\
                    switch (lastState_)\
                    {
```

7.30.1.5 #define SUBSM_DURING(*a*)

Value:

```
if (!a.stateChangeFlag_)\
                        {\
                        a.incTimer();\
                        switch (a.currentState_)\
                        {
```

Macros to help with the usage of subStatemachines.

7.30.1.6 #define SUBSM_END(*a*)

Value:

```
default:\
                        break;\
                        }\
                        a.stateChangeFlag_ = false;\
                        }\
                        a.lastState_ = a.currentState_;
```

7.30.1.7 #define SUBSM_ENTRY(*a*)

Value:

```
default:\
                        break;\
                        }\
                        switch (a.currentState_)\
                        {
```

7.30.1.8 #define SUBSM_EXIT(*a*)

Value:

```
default:\
                        break;\
                        }\
                        }\
                        if (a.stateChangeFlag_)\
                        {\
                        switch (a.lastState_)\
                        {
```

7.31 src/Agent.cpp File Reference

```
#include "lib/Agent.h"
#include "lib/Path.h"
#include "lib/Physics.h"
#include "helper/Vector2d.h"
```

7.32 src/Debug.cpp File Reference

```
#include "lib/Debug.h"
#include <iostream>
```

7.33 src/Enemy.cpp File Reference

```
#include "lib/Enemy.h"
#include "lib/Physics.h"
```

7.34 src/FieldPlayer.cpp File Reference

```
#include "lib/FieldPlayer.h"
```

7.35 src/GameControl.cpp File Reference

```
#include "lib/GameControl.h"
#include <thread>
```

7.36 src/GoalKeeper.cpp File Reference

```
#include "lib/GoalKeeper.h"
```

7.37 src/main.cpp File Reference

```
#include <time.h>
#include <iostream>
#include <thread>
#include "kogmo_rtdb.hxx"
#include "robo_control.h"
#include "lib/GoalKeeper.h"
#include "lib/FieldPlayer.h"
#include "lib/GameControl.h"
#include "lib/Debug.h"
#include "lib/Ball.h"
```

Functions

- int main (int argc, char ∗argv[])

7.37.1 Function Documentation

7.37.1.1 int main (int *argc,* char ∗ *argv[ ]*)

Use client number according to your lab_roso_stud account number!

This is necessary in order to assure that there are unique connections to the RTDB.

Establish connection to the RTDB.

The connection to the RTDB is necessary in order to get access to the control and the status of the robots which are both stored in the RTDB.

In the RTDB there are also informations about the ball and the other robot positions.

Create the client name with the unique client number

7.38 src/Path.cpp File Reference

```
#include "lib/Path.h"
#include "lib/Physics.h"
```

7.39 src/Physics.cpp File Reference

```
#include "lib/Physics.h"
#include "lib/Agent.h"
#include "lib/Enemy.h"
#include "raw_ball.h"
#include <iomanip>
```

Macros

- #define PHYSICS_UPDATE_INTERVAL 30003

7.39.1 Macro Definition Documentation

7.39.1.1 #define PHYSICS_UPDATE_INTERVAL 30003

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