Modelling an Attacking Strategy
Based on Dynamic Path Planning

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Goals

Dynamic Path Planning
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Attacking Strategy
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Conclusion
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Goals

- ⬦ Dynamic influence of path planning by ALICA behaviors
- ⬦ Adapting the heuristic of the A*-Algorithm
- ⬦ Expandable Attacking Strategy

The Computational Geometry Algorithms Library

- ◇ Extensive collection of algorithms from the field of Computational Algebra
- ◇ Supports both Voronoi and Delaunay diagrams
- ◇ Dynamic inserting of Voronoi centers in already created Voronoi Diagram
- ◇ Avoidance of degenerate edges and cells
- ◇ Partially poor documentation
- ◇ Algorithms not always clearly understandable

Voronoi Diagram
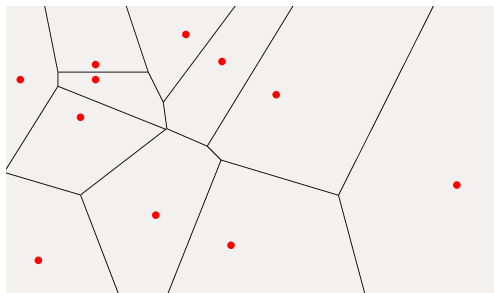
◇ Division of space into Voronoi cells by a set S of Voronoi centers

◇

$$VorR(p, S) = \bigcap_{q \in S \setminus \{p\}} \{x \in \mathbb{R}^2 : |p - x| < |q - x|\}$$

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Dynamic Path Planning
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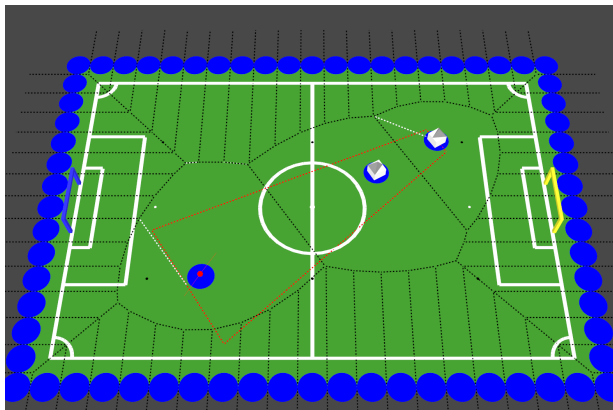
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Path Planning

◇ Path search with the help of an adjusted A*-Algorithm

◇ Division into several steps in order to respond to various situations

◇ Calculates new destination if actual destination unreachable

◇ Influencable by ALICA behaviors

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Procedure of Path Planning

1. Verification of the corridor to the target

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Procedure of Path Planning

2. Path Planning for the requested destination by using the A*-Algorithm

3. If destination unreachable, planning to point near the target

4. If the agent is surrounded by obstacles, calculating a target point between the most distant obstacle and the agent

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Dynamic adding and removing obstacles

Influencing the path planning through artificial obstacles

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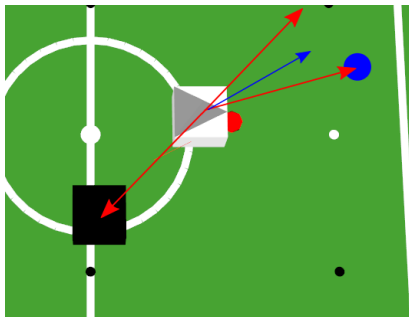Attacking Strategy
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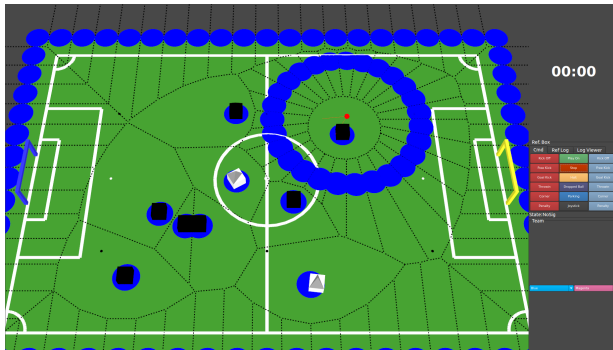
Modelling an Attacking Strategy

Distribution of attacking strategy in different ALICA behaviors

◇ Shielding the ball

◇ Searching for a pass point

◇ Fast pass

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Shielding the Ball

Calculation of the point for aligning the robot

◇ Rotation of the robot around the ball

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Dynamic Path Planning
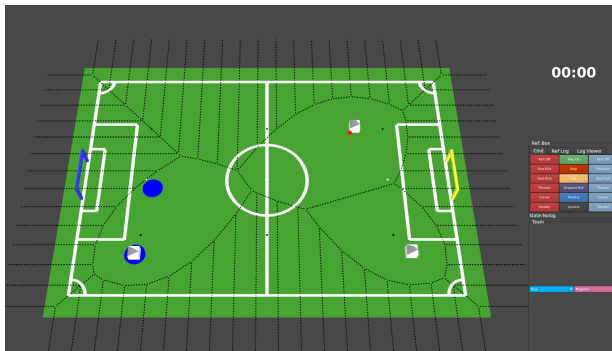○○○○○○

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Searching for a pass point

Checking whether Pass is possible

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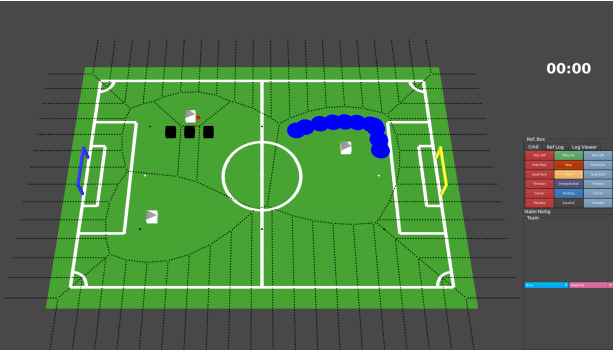
Fast Pass

Pass player chooses best pass point and receiver (marked in blue)

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Summary

- ◇ Insertion and removal of obstacles affects the runtime of ALICA behaviors only slightly
- ◇ Runtime of planning a path has depends on amout of obstacles
- ◇ Runtime of ALICA behaviours is slightly affected
- ◇ Robot successfully avoid obstacles and shield the ball from obstacles

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