4. Milestone

The problem

The goal of the milestone 4 was to implement all the remaining features to the robot to be able to play the game, this includes driving algorithm (with collision avoidance), game logic and referee communication.

Our approach

Game logic and driving algorithm

The game logic consists of a simple state machine. Based on the current state required actions are taken. The game has following self-explanatory states:

wait_for_start, (wait for referee command)
initialize_location, (rotates until position and width is found)
look_for_puck, (drives to closest puck, if not found drives between defined points)
drive_to_puck, (drives directly to puck, if no hit → go to previous state)
drive_with_puck_to_goal, (drives directly to goal)
leave_buck_in_goal, (makes blind movements without collision avoidance)

The driving algorithm has also different states that control how the robot drives. The idea is that the game logic sets the correct state and parameters of the driving algorithm and then the driving algorithm handles all driving related actions.

The driving algorithm creates a collision avoidance point cloud that contains all points that have to be avoided, it is constructed of laser data, kinect data, and field edges as a point cloud. The driving algorithm is designed so that it does not avoid collisions with detected pucks, therefore they are removed from the collision avoidance cloud.

The driving algorithm does not have a path planning algorithm, instead it simply tries to drive around obstacles, which should work since only the other robot and the field edges are real obstacles in the game.

Referee communication

The referee communication was implemented as explained in the instructions, though some network issues caused some extra work.

Improvements

Several small improvements were done, most importantly a bug in the location_node was fixed. The bug was caused by rotation conversion that lost its sign.

Also the naming of the team number was done dynamic, so that it can be passed as argument to the launch files.

Work division

The tasks were divided in the following way for this milestone:

Bálint: Referee communication

Reza: Game logic

Jaakob: Improvements and game logic