

# WitAI Puck Collector

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## Problem definition of the robot

# Problem definition of the robot

# Robot Challenge

- European championship
- Self-made, autonomous and mobile robots
- More than 500 robots expected

**robot**  
challenge



# Puck Collect

sensor technology

+

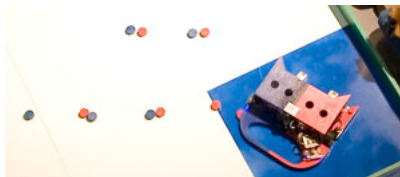
mechanics

+

artificial intelligence

⇓

Goal: collect small discs on the course according to color.

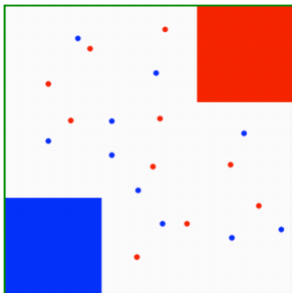


# Puck Collect

- **Game:**  
The robot gets a colour assigned (red or blue).  
At the start of the match each robot is placed on its home base.
- **Aim:**  
The aim of this competition is to collect all pucks of the assigned colour.

# Adaptions to the Field

- Field:  $280 \times 280$  cm
- Homebase:  $70 \times 70$  cm

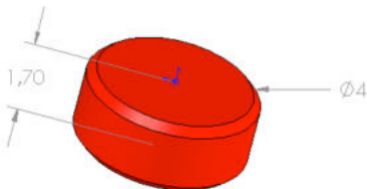


- Field:  $190 \times 155$  cm
- Homebase:  $50 \times 50$  cm



# Adaptions to the Pucks

- Ten pucks of each colour are spread randomly in the neutral zone
- diameter of 4cm
- 8 pucks per color ( more / less )
- max. diameter of 3.5cm (bigger get stuck)



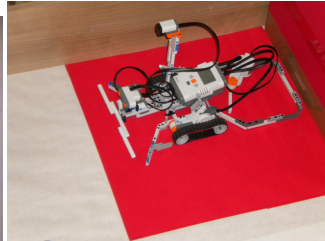


# Number of Robots

- 2 robots



- 1 robot



# Robot Design

# Robot Design

# Used Components

- Lego Mindstorms



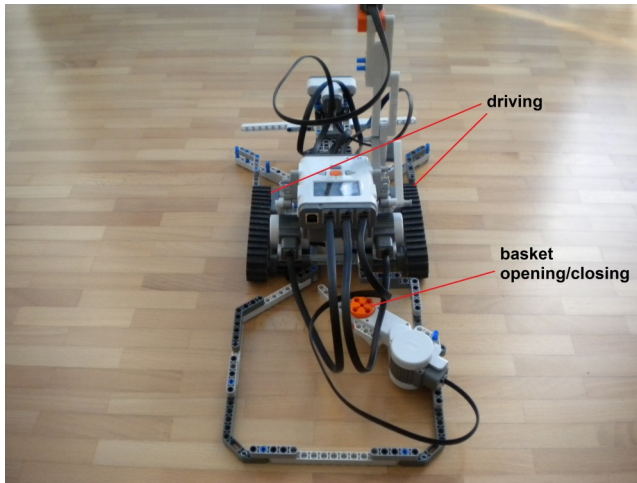
- Not eXactly C



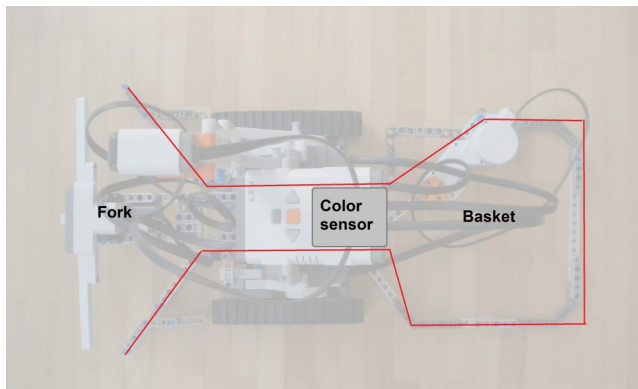
- Bricx Command Center



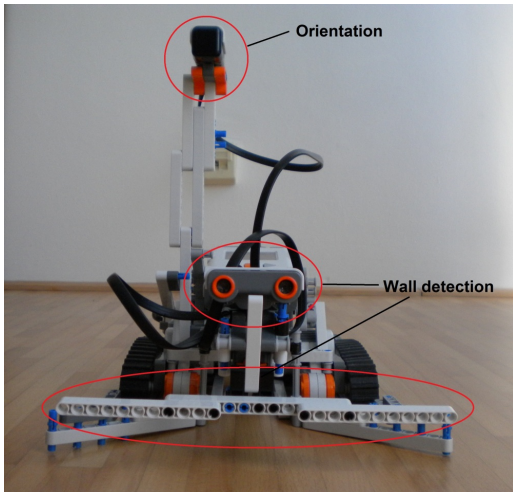
# Engines



# Puck Detection and Collection



# Driving, covering the whole field



# Direction determination

With motor rotation count:

- Wheelspin when trying to rotate
- $\Rightarrow$  too inaccurate

With time measure:

- Wheelspin when trying to rotate
- Performance of the engines depends on the power of the batteries
- $\Rightarrow$  too inaccurate

# Direction determination

Compass sensor:

- rotation based on the sensor data  $\Rightarrow$  more accurate
- mounted 15 cm away from motors and 10 cm away from the NXT brick
- must be kept leveled to read correctly
- sensor data can be influenced from
  - the structure of the robot
  - external magnetic fields like refrigerators or other metal objects



## Subtasks of the robot

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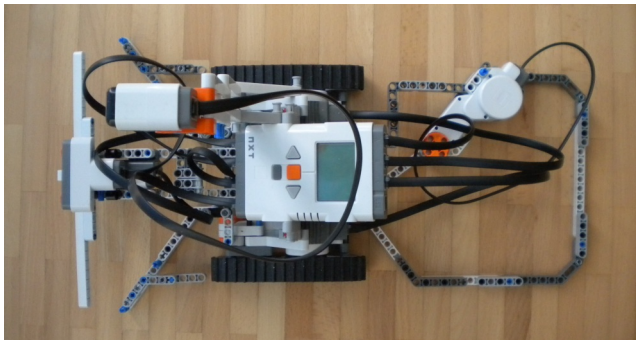
Two subtasks:

- Puck Detection and Collection
- Driving, covering the whole field

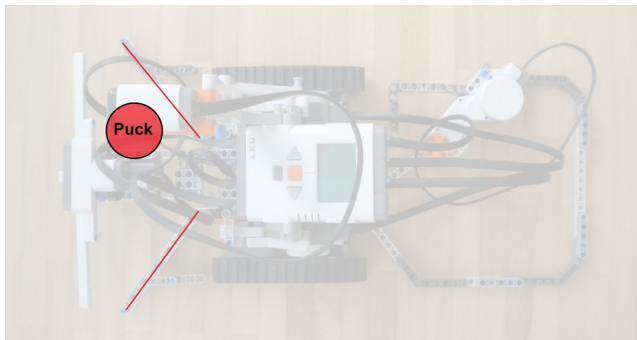
# Puck Detection and Collection

- Puck Color is sensed at the color sensor
- Basket is opened/closed according to color
- Stays opened/closed for the distance to the color sensor
- Distance is measured in motor rotation count  $\Rightarrow$  independent from motor speed

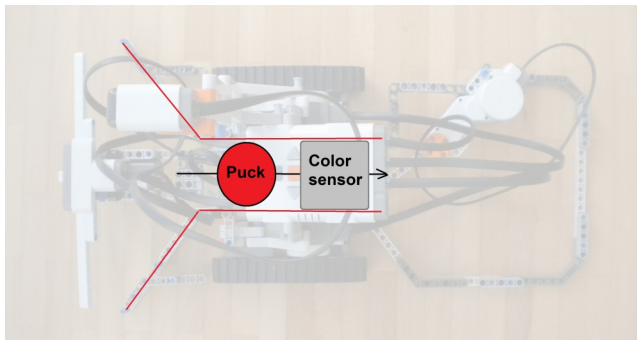
# Puck Detection and Collection



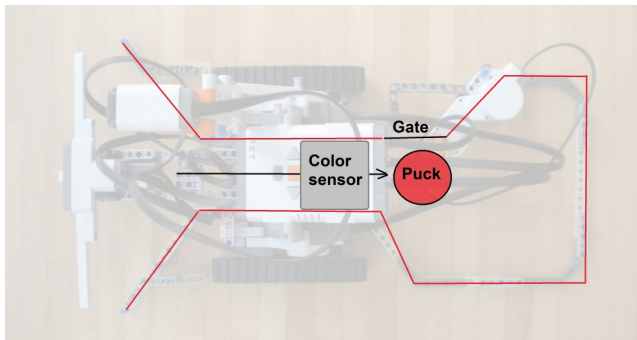
# Puck Detection and Collection



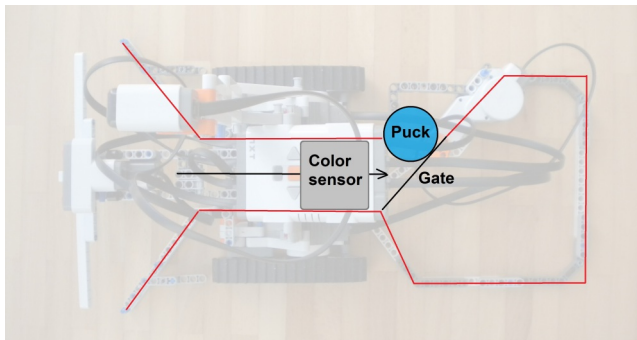
# Puck Detection and Collection



# Puck Detection and Collection



# Puck Detection and Collection







# Driving, covering the whole field

## Implemented Strategy 1

- Wall for orientation after every length  $\Rightarrow$  errors don't add up
- Longer straight lines  $\Rightarrow$  faster
- No overlaps in the course

# Demonstration

# Demonstration...