Tech United Eindhoven

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Tech United Eindhoven

TU/e Technische Universiteit Eindhoven University of Technology

Team: Tech United

What happened since last workshop:

- 1st place @ Portuguese Open 2017
- 2nd place @ RoboCup 2017

- 24 team members
  - ➢ 5 new members
  - ➢ 2 Bachelor students (BEP)
  - ➢ 3 PhD's

- 2 projects in cooperation with
  RIF

- New Soccer Field!

Current Foci

Strategy:

- **More Back Passes:** (properly) include a 3rd or 4th attacker.
- **Attacking:** response after catching the ball is too slow.
- **Configurable Strategy:** easily change the strategy for each opposing team.

World model:

- **Kinect:** utilize this powerful to its utmost.
- **Worldmodel:** tuning of the filters.

Skills:

- **Human Dribble:** regaining a new 3 metres circle for dribbling.
- **Use the gyro:** improve the accuracy of the shot while rotating.

Current Foci

Low-Level & Hardware:

- **Improve Shooting:** *aiming for* more accuracy.
- **8 Wheeled Platform:** prepare the 8 wheeled platform such that it can be used during the matches.
- **Improve Low-Level Motion Control:** implement cascaded control and feedforward.

Vision:

- **Recognize Opponent Number Plates:** enable the recognition of opponent number plates.
- **New Ball Calibration Tool:** faster, more accurate, less ghost balls.

Configurable Strategy

Configurable Strategy

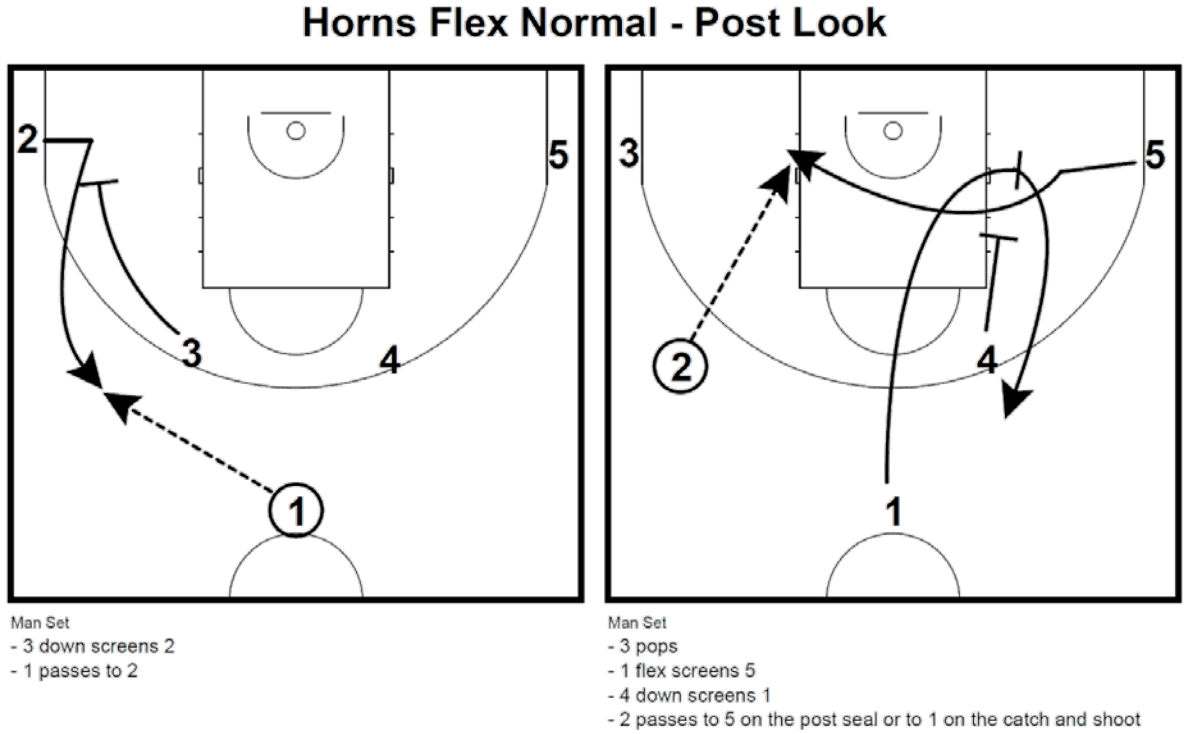
A lot of *challenges* were identified from Robocup 2017, among those:

- we are predictable, how to overcome this,
- we want to easily implement set-plays,
- we want to learn from our games.

Identified solution:

a more configurable strategy,

the STP Framework.



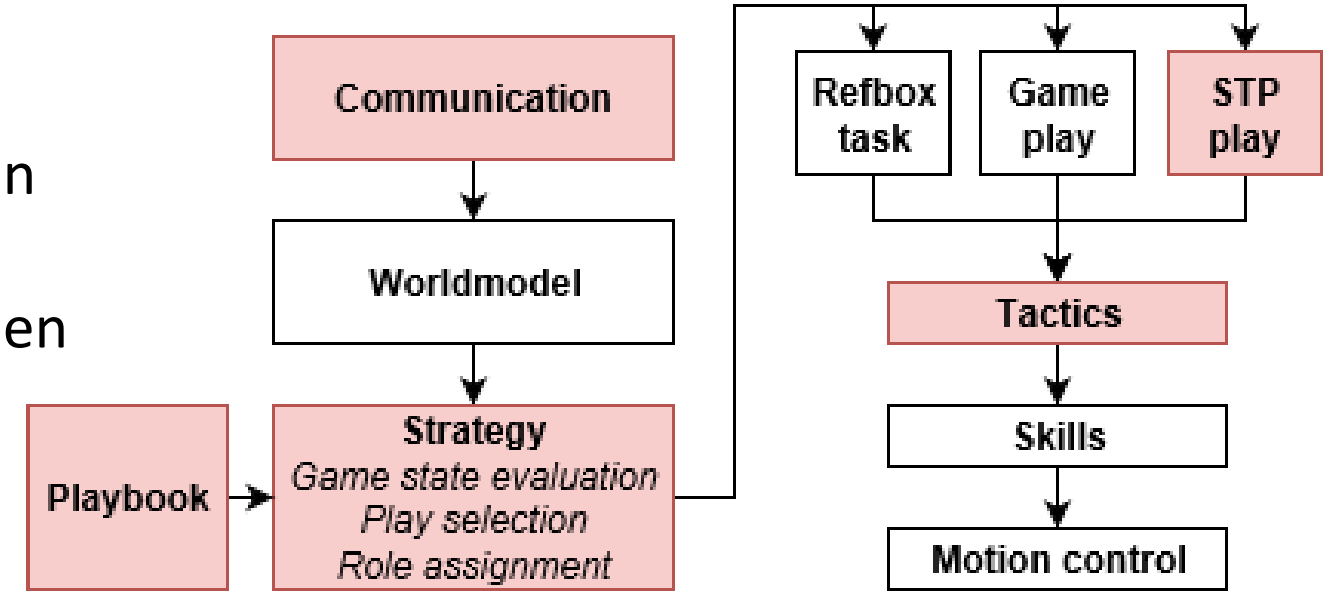
STP Framework

Based on:

C.K.M. de Koning, J. P. Mendoza, M. Veloso and M.J.G. van de Molengraft, *Skills, tactics and plays for decentralized multi-robot control in adversarial environments*

Current status:

- most of the STP framework has now been implemented,
- already a couple of Refbox tasks have been implemented,
- we still have to include the role-assigner into the framework.



8 Wheeled Platform

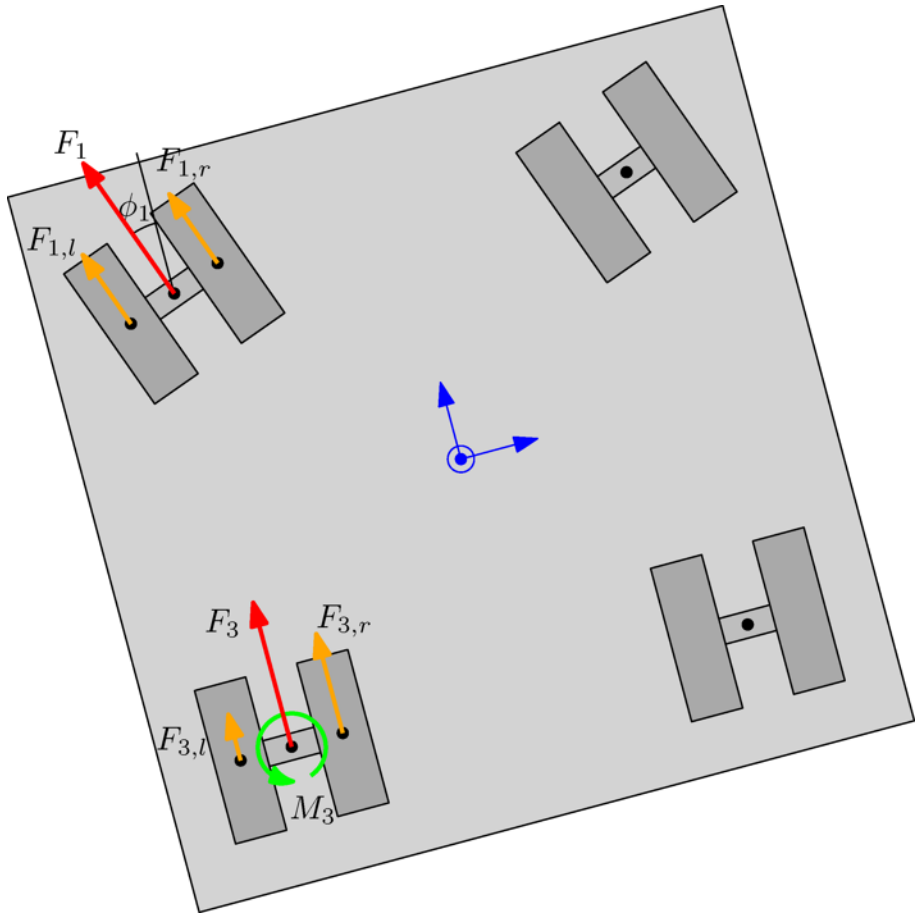
8 Wheeled Platform

8 Wheeled Platform

Current Status:

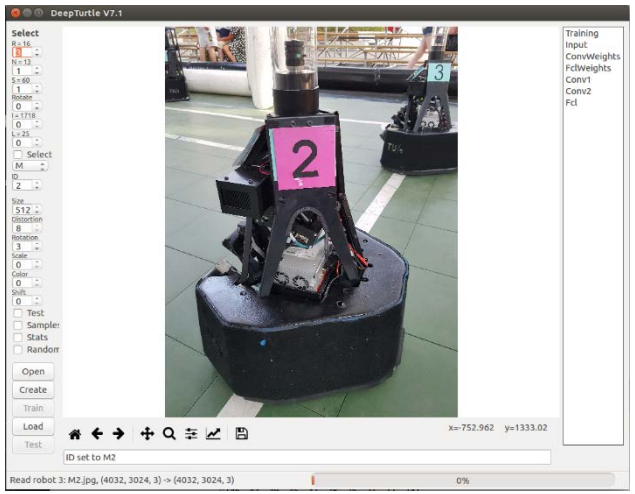
- improving the control of the wheel units, by upgrading the processor in the wheel units.
- , along with full redesign of wheel units, to also make them lighter.

- Answering: how to turn this robot into a TURTLE?
  - Kicking,
  - Ball handling,
  - Computer, etc.



Recognizing Opponent Labels

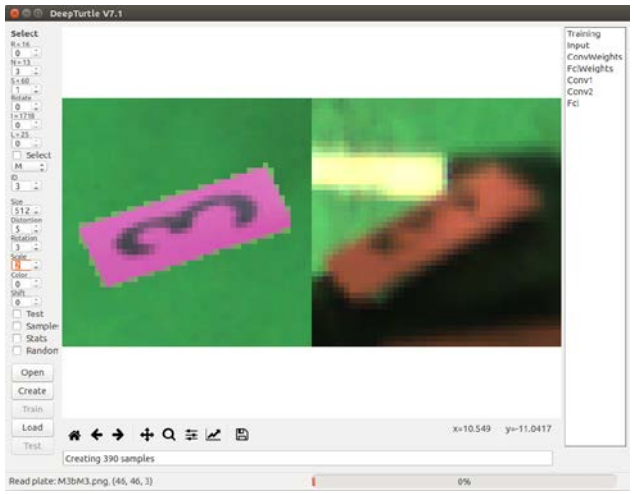
Recognizing Opponent Labels



Photos of Labels

Distortion,
Rotation,
Scale,

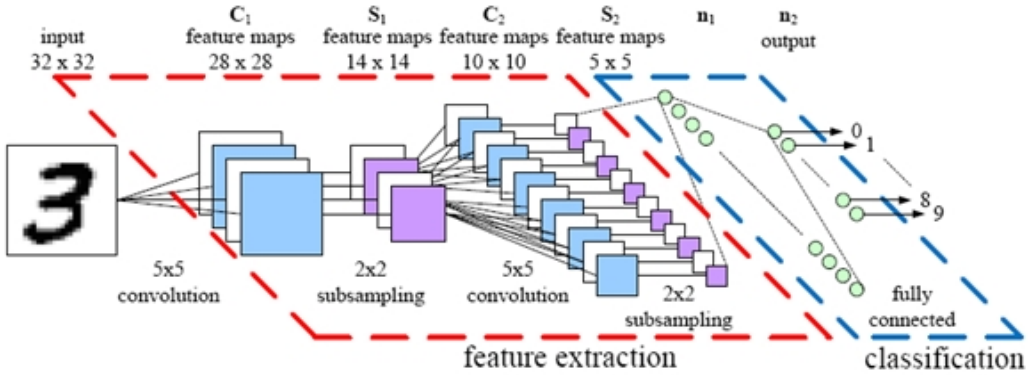
Color,
Shift



Distorted Image

> 60.000 variations

Deep MNIST Network

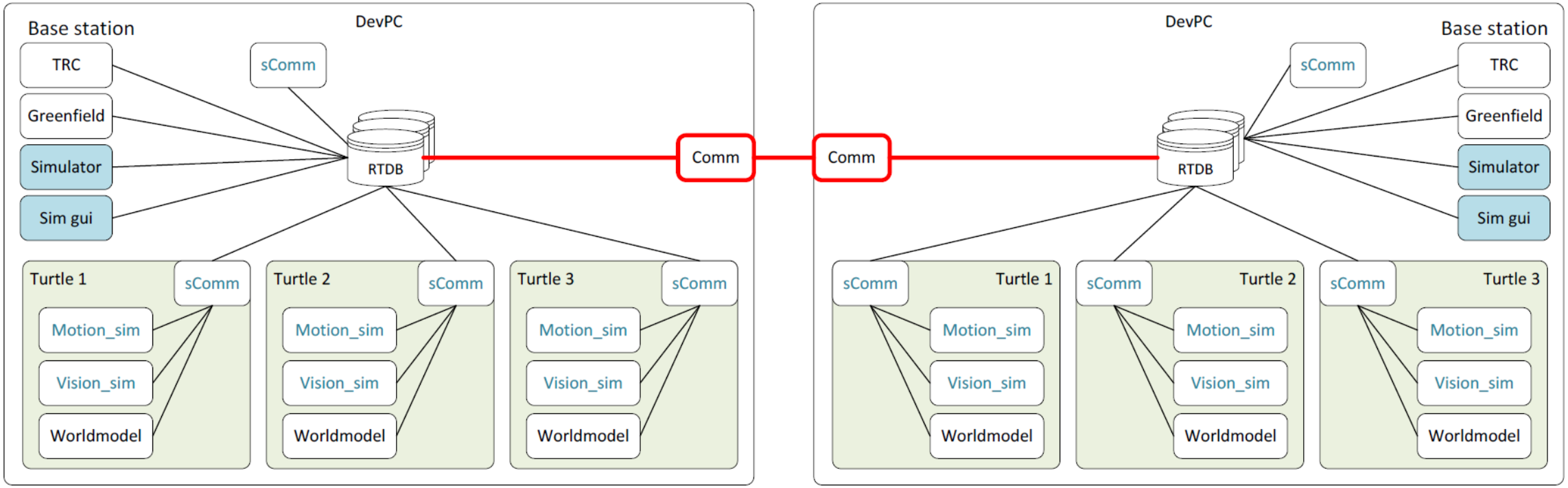


Common Simulator

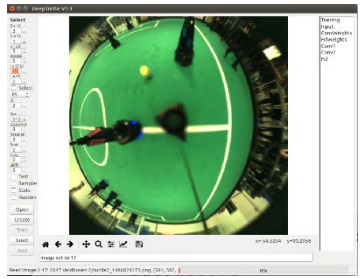
Simulator Link – Kassel 2016

Kassel, 2016 – we have worked on extending the *Tech United Simulator Link* to be used inter-team (Tech United and Cambada), semi-successfully.

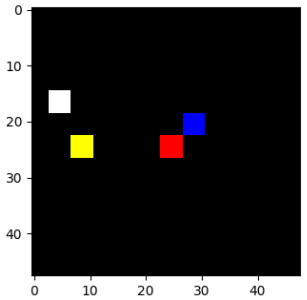
Why? We want to test our strategies more often!

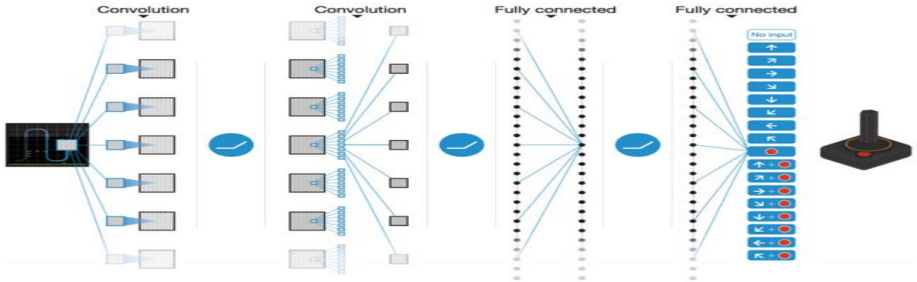


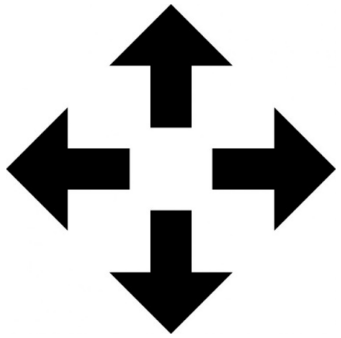
Common Simulator



Omni-vision image







Deep Q-Learning Recurrent Neural Network

Simulator
(*behavior:* A*)

Thank you for your attention!

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