

# New Experiences with the RoboNewbie Software

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With Great Thanks to all participating  
student teams and their institutes!

## Robotics is an integrative task

- Software: Perception, Motion, Control,
  - Hardware: Sensors, Actuators, Processors,
  - Energy,
  - ...
- 
- Biology, Medicine, Sports,
  - Psychology, Philosophy, Sociology,
  - Physics, Mathematics, Informatics,
  - Materials, Design, Engineering,
  - ...

# Toolkits for Basic Experiments

# Testbed for more complex behaviour: RoboCup Soccer Robots

## Skills:

- Walk, StandUp, Kick, Catch ...

## Perception:

- Where are the ball, the goals, other players
- Where am I
- What are other players doing

## What should I do?

- Attacking, Defending, Supporting
- Go to ball, Kick the ball (to which direction?)

## How can do it?

- Walk forward/sideward/backward, Turn
- Kick, Catch, Push (foul)





RoboCup 2016 in Leipzig/Germany  
First time with natural light.

*Video <https://www.youtube.com/watch?v=Amx3UzI10zU>*

*Think about code for better performance ...*

*Think about testing ...*

*Think about project management ...*

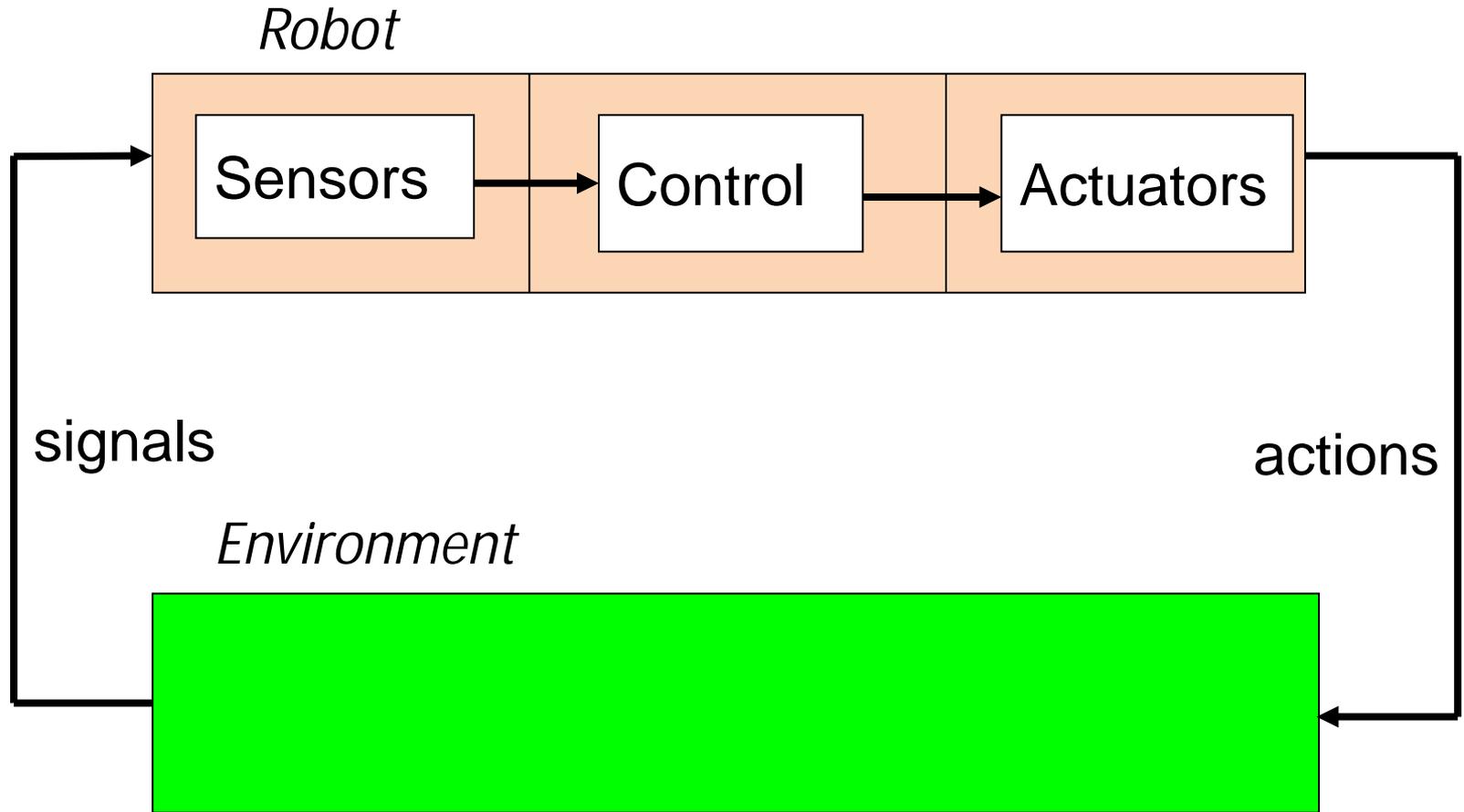
Real robots require high efforts for materials, construction, maintenance

Simulation as alternative with

- Behavior like real robots
- Simulated sensors, motors, controls like real robots

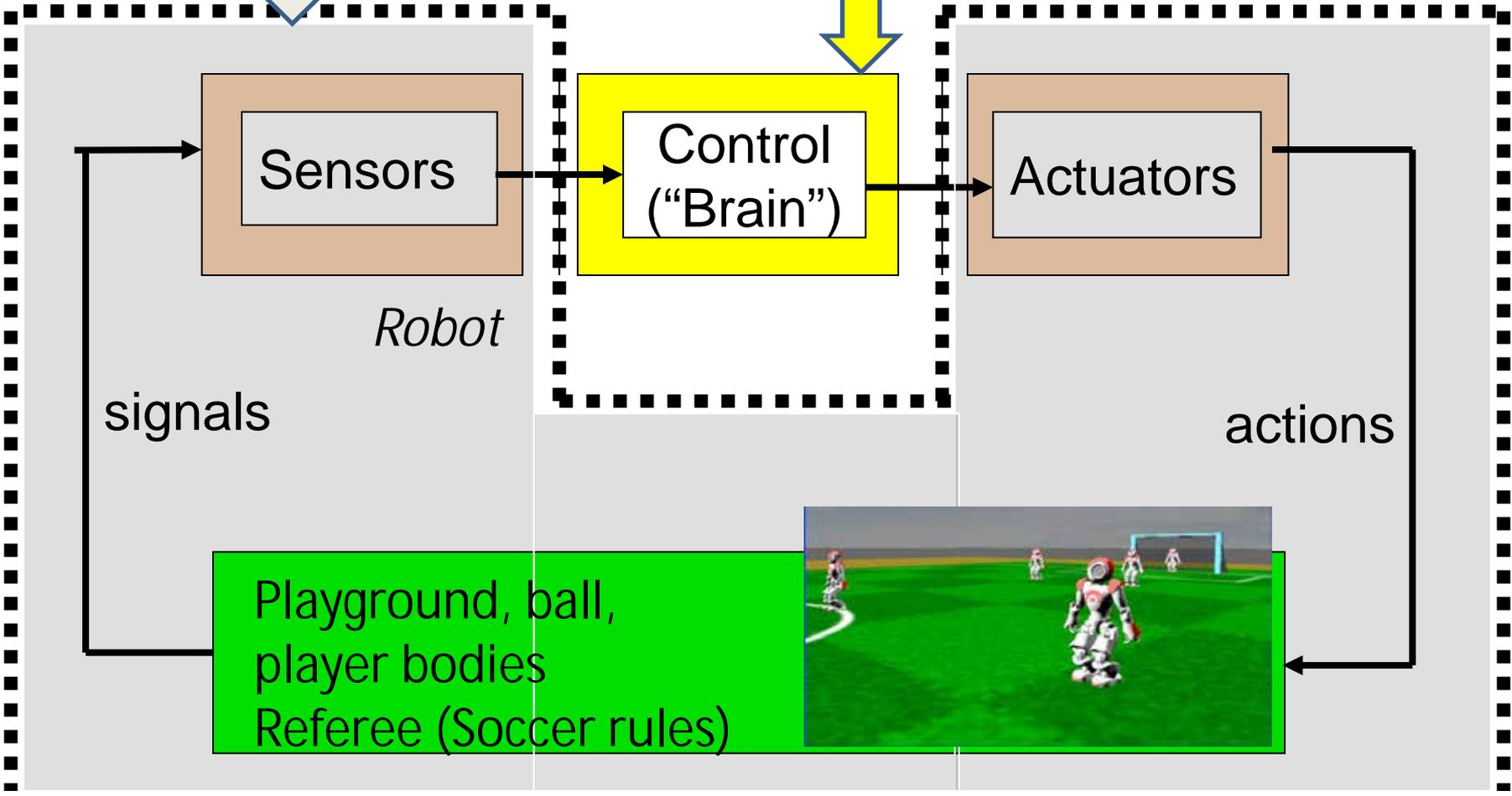


# Real Robot in Real World



Simulated World:  
RoboCup SimSpark

Control of  
Soccer  
robots



# RoboNewbie Project: Support for Programming Simulated Soccer Robots

Diploma Thesis by Monika Domanska  
at Humboldt University 2012

- Framework based on Java and Netbeans.
- Hides non-robotics aspects  
(e.g. communication with Simspark).
- Basic motion skills (walk, standup, turn).
- Basic examples/exercises for experiments.

Download of all programs and materials from our website  
<http://www.naoteamhumboldt.de/projects/robonewbie/>



Berlin United - Nao Team Humboldt

Artificial Intelligence - Humboldt University Berlin

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## RoboNewbie

RoboNewbie is a basic framework for experiments with simulated humanoid robots. It provides interfaces to the simulated sensors and effectors of the robot, and a simple control structure. The framework and the examples are implemented in JAVA with detailed documentations and explanations. That makes it useful even for beginners in Robotics.

RoboNewbie runs in the soccer simulation environment of the official RoboCup 3D simulator. The simulated soccer players are models of the Humanoid Robot NAO of the French Company Aldebaran. Besides other examples, a simple soccer playing robot demonstrates the architecture and the features. Users are encouraged to extend it by different means.

Thanks are due to the RoboCup community for continuous help and inspiration.

Last updated of project files: June, 14th, 2013.

### Resources for Download

- [Installation](#)
- [How to start](#)
- [RoboNewbie\\_1.0](#) – the framework and example programs. It is programmed in JAVA 7 and prepared for use under Netbeans. The "QuickStartTutorial" gives an introduction to the features and the usage of RoboNewbie.
- The [SimSpark RoboCup 3D Soccer Simulation \(SimSpark RCSS\)](#)-Version r300 for Windows is configured for RoboNewbie. SimSpark RCSS was developed by the RoboCup Soccer Server Maintenance Group. A short overview is given by "[SimSpark/SoccerServer RCSS as used for RoboNewbie](#)", the detailed information can be found on the [SimSpark Wiki](#).
- The [MotionEditor](#) can be used for the design of motions. Installation and usage are described by the "[MotionEditor Tutorial](#)". To use the motion editor you need [JAVA 3D Version 1.5.1](#) on your computer.



English  
Deutsch

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Lab-meeting: Monday 13:00 – 15:00

Search for:

### RECENT POSTS

- [RoboCup 2013 Links and Livestream](#)
- [SPL Qualifikations Video 2013](#)

### NAO'S CALENDAR

Termine werden angezeigt ab  
21.8. [Frühere Termine suchen](#)

Termine werden angezeigt bis  
30.9. [Weitere Termine suchen](#)

Überblick

### RELEVANT LINKS

- [German National RoboCup Committee](#)

Download and Installation are guided by documents

Usually takes less than 1 hour

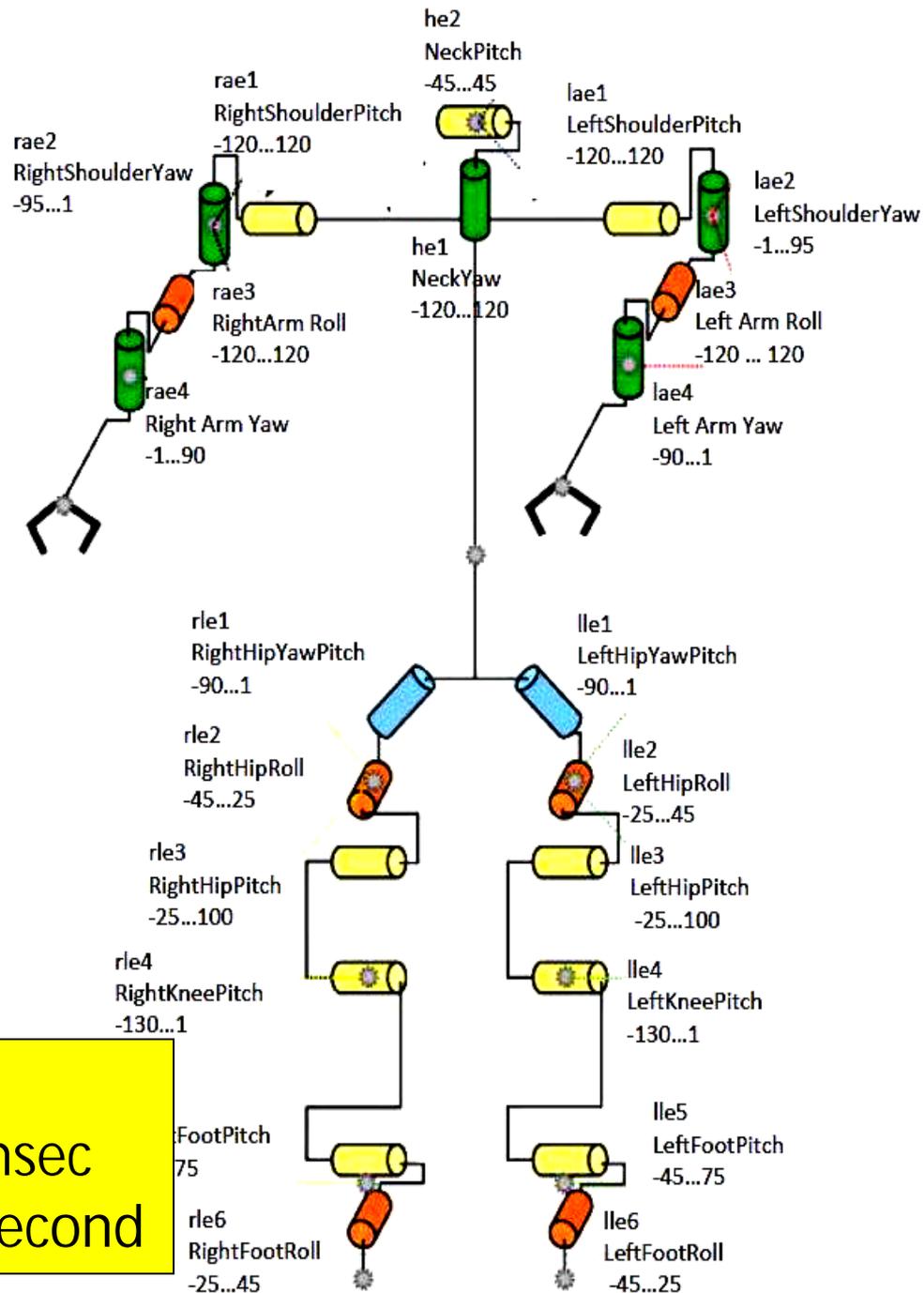
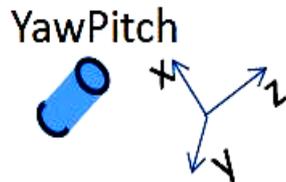
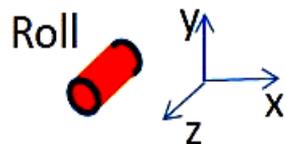
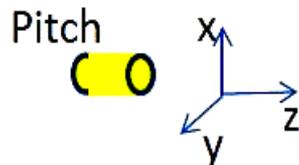
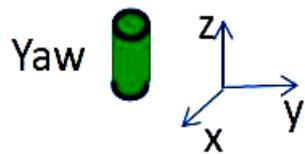
- Installation
- How to start
- RoboNewbie\_1.0 – the framework and example prepared for use under Netbeans. The “Quickstart” document describes the features and the usage of RoboNewbie.
- The SimSpark RoboCup 3D Soccer Simulation is configured for RoboNewbie. SimSpark RCS is maintained by the RoboCup Maintenance Group. A short overview is given in the “RoboCup 3D Soccer Simulation” document. For “RoboNewbie”, the detailed information can

# Motion design supported by Motion Editor

The screenshot displays the MotionNet Editor interface. On the left, a 'Joints' panel lists 22 joints with their respective values and sliders. The joints are grouped into Head, Shoulder, Arm, Hip, Knee, and Ankle. The right side shows a 3D view of a robot model with the text 'nothing selected' overlaid in yellow.

Joint	Value	Range
Head	-28	-120.0
Yaw	23	-45.0
Pitch		
Shoulder		
Pitch left	-97	-120.0
Pitch right	-120	-120.0
Yaw left	37	-1.0
Yaw right	-34	-95.0
Arm		
Roll left	-82	-120.0
Roll right	119	-120.0
Yaw left	-80	-90.0
Yaw right	89	-1.0
Hip		
YawPitch left	-58	-90.0
YawPitch right	-58	-90.0
Pitch left	-21	-25.0
Pitch right	51	-25.0
Roll left	45	-25.0
Roll right	18	-45.0
Knee		
Pitch left	-63	-130.0
Pitch right	-63	-130.0
Ankle		
Pitch left	-9	-45.0
Pitch right	17	-45.0
Roll left	4	-45.0
Roll right	-25	-25.0

**Motion Control:**  
22 joints at every 20 msec  
1100 commands per second



Motion Control:  
 22 joints at every 20 msec  
 1100 commands per second

RoboNewbie was used for exercises  
in different courses on Cognitive Robotics.

Only simple requirements were supposed.

Students:

- Programming skills with Java and Netbeans
- Some physical and mathematical background to understand the theoretical and practical issues of Robotics.
- Work in teams of 3-5 participants

Technical Equipment:

- Labtops (preferable) or lab computers  
with Windows, Java, Netbeans, Java3D

## Courses supported by DAAD (since 2013 by our program):

2012 Ohrid

(DAAD INTENSIVE COURSE

“Robotics and Mathematics” together with Nevena Ackovska)

2013 Novi Sad

Rijeka

Sarajevo

2014 Plovdiv

Rijeka

2015 Skopje

Sarajevo

2016 Rijeka

Planned: Tirana

Plovdiv (knowledge transfer to teaching staff)

Further courses:

- Humboldt University Berlin
- Vistula University Warsaw
- Anna-Seghers-Schule Berlin

Typical Duration of a course were 30 hours with up to 30 participants.  
Lectures and exercises mixed.

Topics of lectures:

- Motion (Kinematics, Motion Planning and Control, Drive Systems, Legged Robots, Learning, Biologically Inspired Motions)
- Sensors (Signals, Sensors Types, Vision/Camera Model, Interpretation)
- World Models (Representations, Probabilistic Methods)
- Behavior Control (Control Architectures, Rationality, Behavior Based Robotics)

## Exercises:

- Introduction to SimSpark and RoboNewbie.
- First experiments with motion design (knee bend).
- Preparation for the **final competition** in groups of about 4 students.

## Exercises include

- homework
- common discussions about ideas for the competition

Each participant prepares a written report on her/his efforts for the competition (ideas, implementations, results).

Competition rules have been **modified over the years**.

## Workshop Competition

Task:

Become the Soccer Champion of the Fast Scoring Competition of Ohrid!

The task is to score as soon as possible (as described below).

The example agent `SimpleSoccer` pushes the ball towards the goal. During 10 minutes it almost reaches the goal with the ball. You can use this program as an inspiration for your task.

You can modify and extend it with new motions, better perception and more intelligent behavior. You can even program a team of up to 4 robots which cooperatively perform the task.

Start positions for up to 4 players  
(unknown before the competition)

Time to score: 3 minutes



Start positions for up to 4 players  
(unknown before the competition)  
**Actually, teams used only 1 player.**

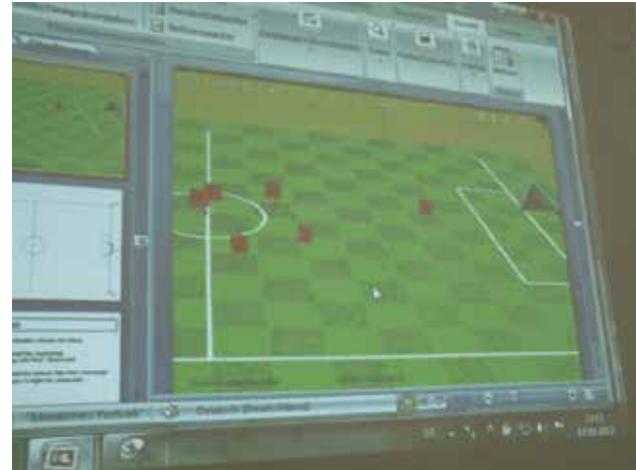
Time to score: 3 minutes



# Team Work in Ohrid



# Competition in Ohrid



Best results in Ohrid 2012:  
180cm before goal

### Champion Team 3:

Zoltan Geler

Novi Sad

Ovidiu Parvu

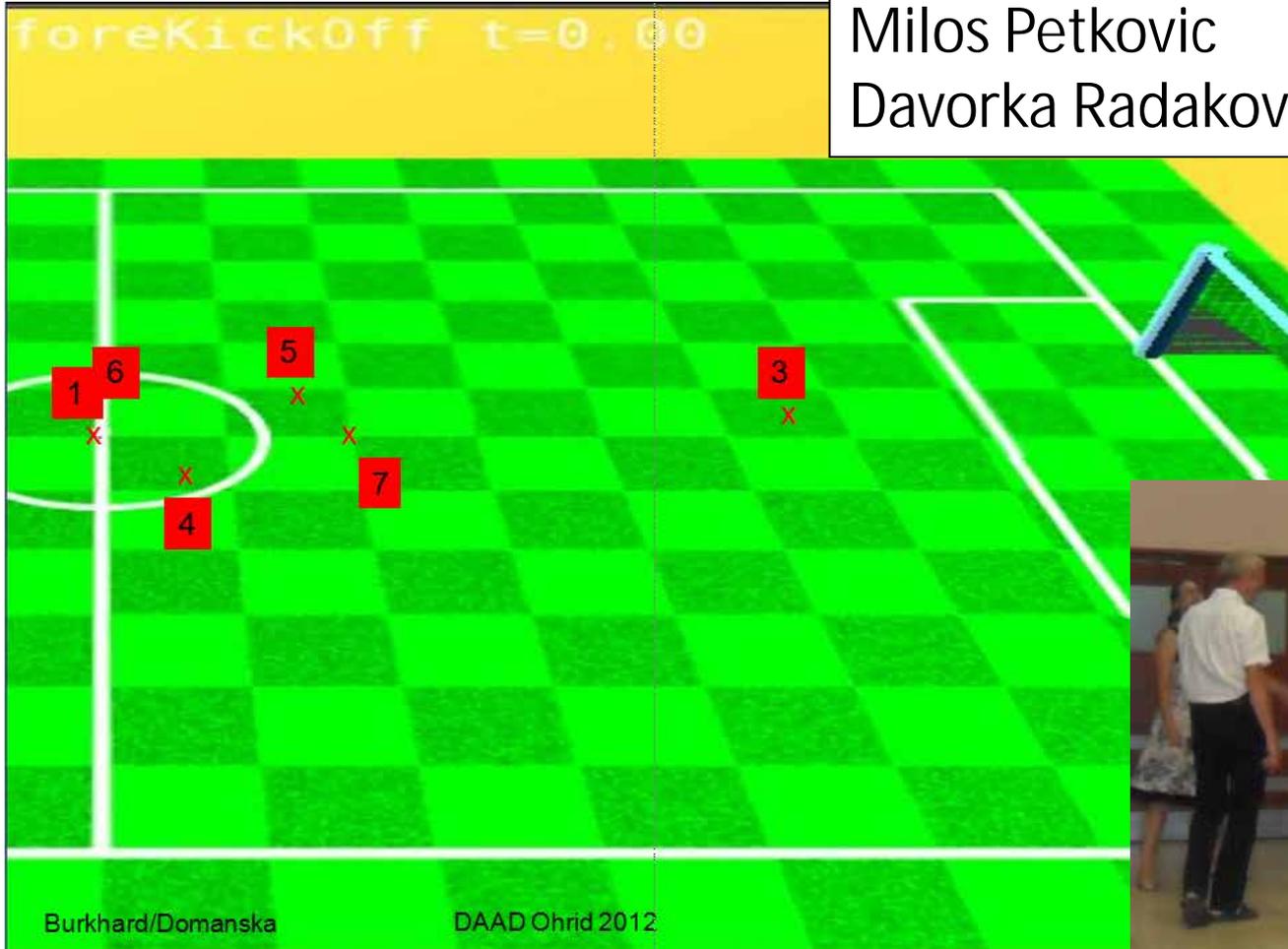
Cluj

Milos Petkovic

Nis

Davorka Radakovic

Novi Sad



Award Ceremony

Competition rules unchanged until 2014  
(3 minutes, up to 4 players, unknown positions)

2013: Novi Sad  
Rijeka  
Sarajevo

2014: Plovdiv



2013 Novi Sad

Improvement: 80cm before goal

Champion: Dragan Nedeljkov  
(no teams)



Novi Sad 2013



7

2013 Rijeka

First time: Scoring!

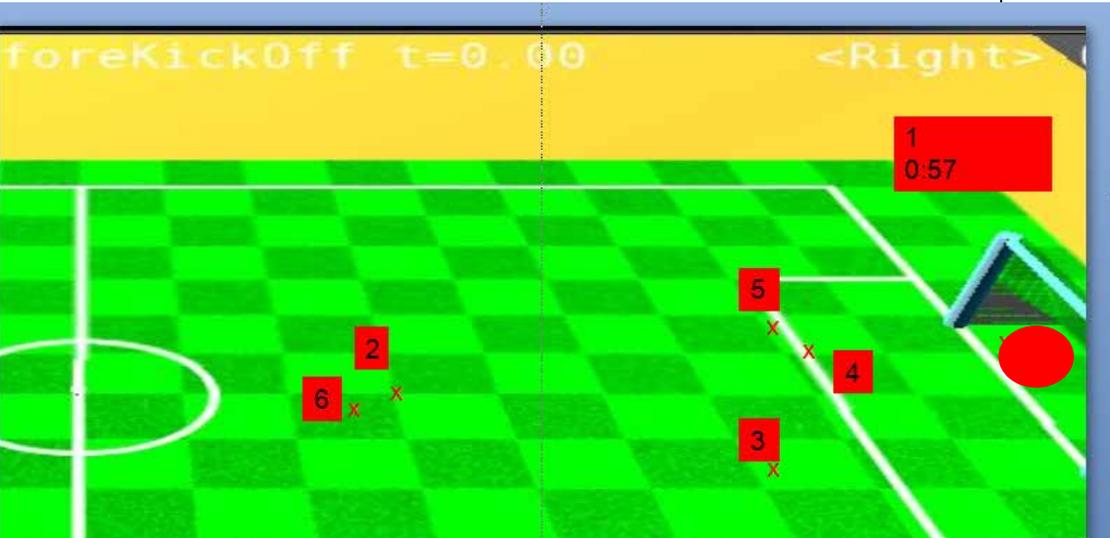
Time: 57 sec.

Champion: Team1

Marina Bajčić

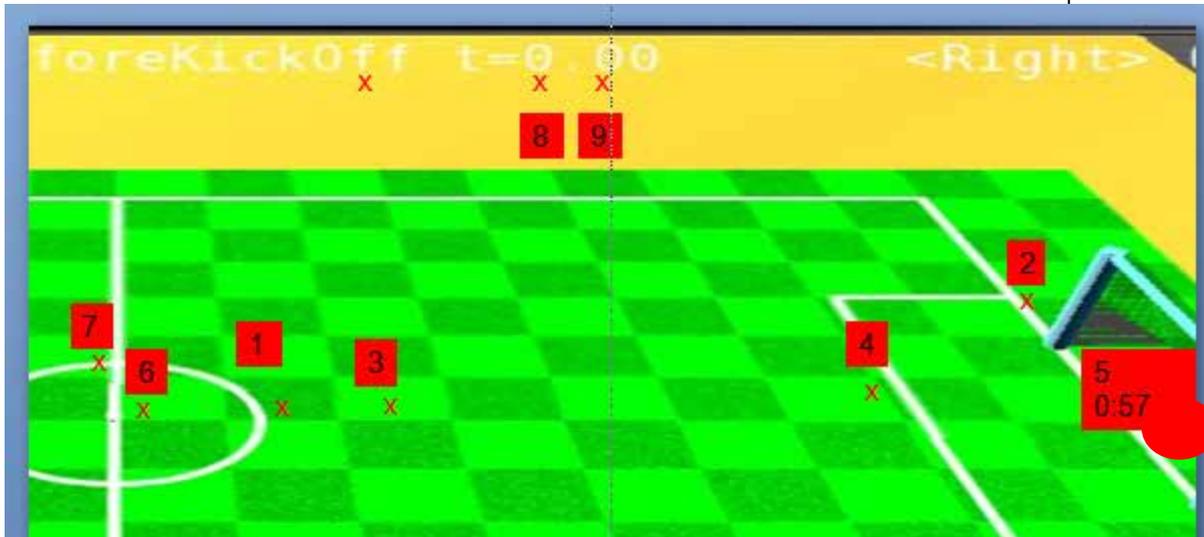
Kristina Prodanović

Luka Unuk



2013 Sarajevo

Again scoring after 57 sec!



Champion: Team5

Jusić, Emir

Tucaković, Zlatan

Zubanović, Damir

Merzić, Hamza



2014 Plovdiv

2 scores: 40 sec !, 102 sec

Champion: Team 6

Damyan Damyanov

Ivelin Rusev

Petar Bilev

Vasil Palagachev



## Fast Scoring Problem solved.

New kind of competitions: Matches between teams.

Extension of RoboNewbie:

Support for programming teams.

Single program which can play different roles, e.g.

- Attacker
- Goalkeeper

Skills for kicking and walking

from former competitions (Rijeka, Plovdiv) provided

2014 Rijeka

Matches 4 by 4, 2 times 5 minutes

## Competition

Become the Champion  
of the First RoboNewbie Competition!

There will be a championship with your programs at the end.  
More details are described below (and may be adapted later).

A RoboNewbie soccer team can consist of up to 4 players  
(e.g. goalie, defender, attacker, ...).

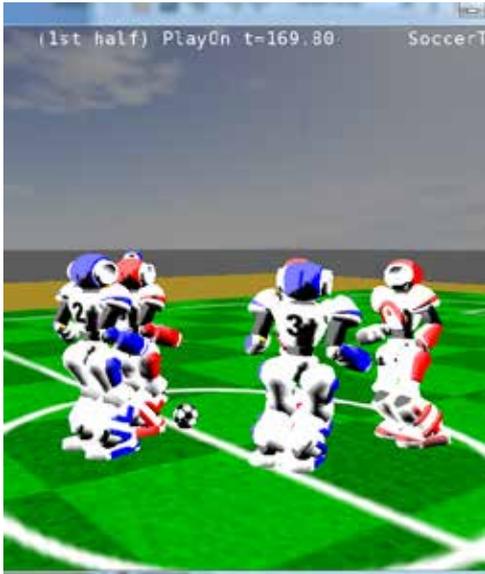
The sample program **Agent\_SoccerTeam** was provided  
which has already some basic skills for walk, turn, kick.

You can modify and extend it with new/better skills, better  
perception, more intelligent behavior. Or write own programs.

Datum

Rijeka 2014

1



No goals,  
winner by penalties.

Champion: Team TMS:  
Toni Butković  
Matko Abramović  
Kristian Skender.

## Competition Results

	Match 5 minutes	Penalty in case of draw 2 trials each
TMS - Atom	0:0	0:0
Atom - <u>Potatoes</u>	0:0	0:0
<u>Potatoes</u> - TMS	0:0	0:2

	Won (3 pts)	Won by Penalty (2 pts)	Drawn (1 pt)	Lost by Penalty (1 pt)	Lost (0 pts)	Points	Goal diff. Match.	Goal diff. Penalt.	Place
TMS		1	1			3	0:0	2:0	1
Atom			2			2	0:0	0:0	2
<u>Potatoes</u>			1	1		2	0:0	0:2	3

Datum

Rijeka 2014

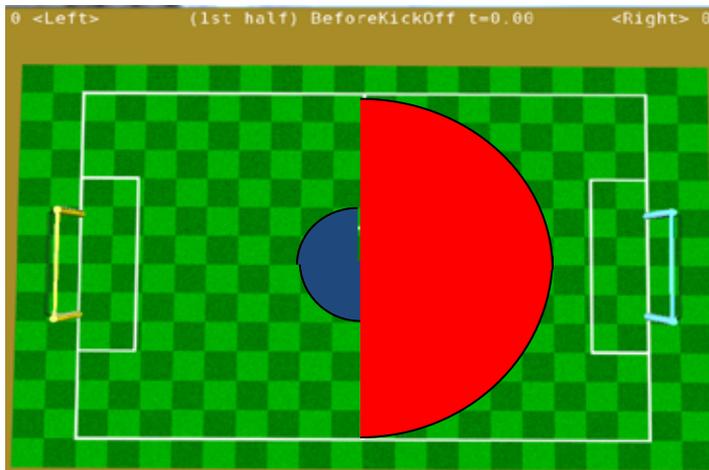
14

New rules: Games 1 by 1

Initial poses outside of colored areas in the own half:

Blue team (left) acts as offender,

Red team (right) acts as defender (e.g. with a goal keeper)



Matches 2 x 2 minutes

With preliminaries in 2 groups, half finales and finales.

Fast scoring challenge in case of draw.

Skopje 2015, 6 teams

Champion: Team Bomba  
Spasovska, Beti  
Velkoska, Natalija  
Dembovski, Aleksandar  
Jovanovski, Stole

The SMART board contains handwritten notes detailing match results and a tournament bracket. The match results are as follows:

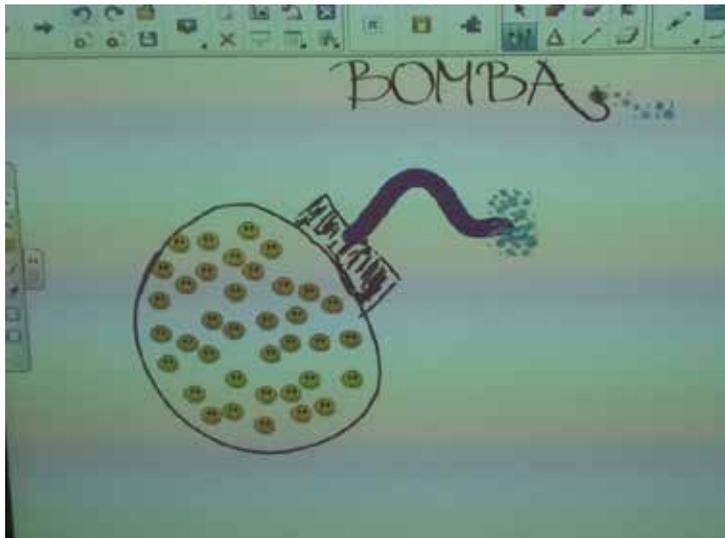
- ISAAC vs. Bomba 0:0
- SBJS vs. Relief 1:0
- ISAAC vs. Relief 0:0
- Fih Bomba vs. SBJS 1:0

The tournament bracket shows the following progression:

- Round 1: ISAAC (3) vs. ROBOJEDIS (3)
- Round 2: SBJS (2) vs. ISAAC (3)
- Round 3: Relief (1) vs. Bomba (2)
- Final: Bomba (2) vs. Team Sloth (3)

The entry for 'Fih Bomba vs. SBJS 1:0' is circled in red.

# Skopje 2015, 6 teams



## Next Rules: Games 2 by 2

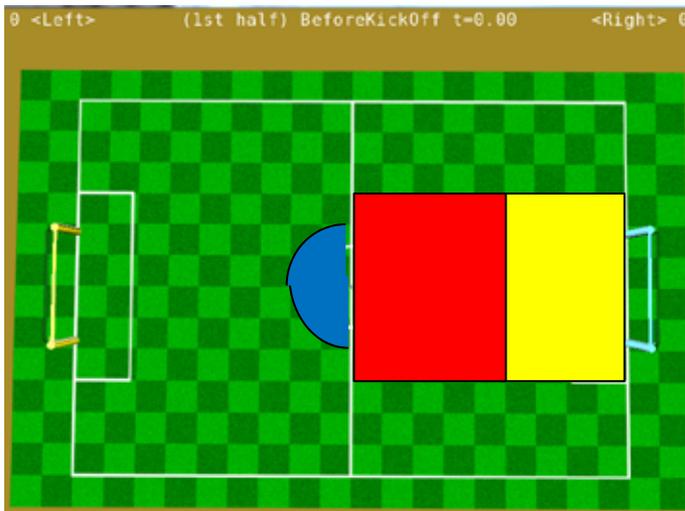
Offending team (left team with kick-off):

Both players outside of blue area (Distance to ball  $\geq 1\text{m}$ )

Defending team (right team)

Player 1: outside of red area (Goalkeeper)

Player 2: outside of red and yellow areas



Matches 2 x 2 minutes.

With preliminaries in 2 groups, half finales and finales.

Fast scoring challenge in case of draw. Jahorina 2016

# Sarajevo 2015, 5 teams

Schedule:

Tuesday, Nov. 3rd: Start of course

Wednesday, Nov. 4th: Constitution of Groups

Friday

Saturday

Sunday

Monday

Tuesday, Nov. 10th: Fast scoring challenge

Wednesday

Thursday, Nov. 12th: Competition

- 
- ranking of teams
  - test of competition computer

Sarajevo 2015, 5 teams

Finale: 1:1

Fast Scoring Challenge:

2 m : 1.8 m

Champion: Bombo Team

Sumejja Porča

Luka Pejović

Handwritten table on a chalkboard showing tournament results for Sarajevo 2015. The table is divided into sections for group matches, semifinals, and a final challenge.

**Group Matches:**

Lepi - Muller	1:0
Muller - Lepi	0:0
Lepi - FCO	2:0
FCO - Lepi	0:0
Muller - FCO	0:0
FCO - Muller	0:0
Bombo - Aut	0:0
Aut - Bombo	1:0

**Semifinals (HF):**

Lepi - Bombo	0:0
Bombo - Lepi	1:0
Muller - Aut	0:0
Aut - Muller	0:0

**Final Challenge (F):**

Bombo (1.8m) - Aut	1:0
Aut - Bombo (2.0m)	1:0

**Summary Table:**

Team	Points	Goals	Rank
Lepi	8	3:0	1
Muller	2	0:1	2
FCO	2	0:2	3
Bombo	1	0:1	2
Aut	4	1:0	1

# Rijeka 2016



Durkhard



Janina 2010

30

Rijeka 2016

5 teams

Again with preliminaries ...

## Preliminaries of Competition on April 21

Group 1	Achtung	<u>Knockenstiff</u>	<u>Diefantastisch</u> en Vier	Points	Goals	Rank
Achtung	X	0:0	1:1	2	1:1	27sec 1
<u>Knockenstiff</u>	0:0	X	0:0	2	0:0	36sec 2
<u>Diefantastisch</u> en Vier	1:1	0:0	X	2	1:1	3.5m 3

Group 2	HerthaBe rlin	<u>Energy</u>	Points	Goals	Rank
HerthaBerlin	x	1:0	3	1:0	1
<u>Energy</u>	0:1	X	0	1:0	2

Rijeka 2016

5 teams

... and finales

## Finals of Competition on April 21

Half finals:

Achtung	Energy	3:2
HerthaBerlin	<u>Knockenstiff</u>	3:0

Finals:

3./4. places

<u>Energy</u>	<u>Knockenstiff</u>	0:0 35sec : 5m
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1./2. places:

Achtung	HerthaBerlin	0:3
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Datum

Rijeka 2016

14

Rijeka 2016

5 teams

Successful goalkeeper!

Champion: Hertha Berlin

Jan Božić

Edvin Močibob

Matej Šamanić

Tomislav Šubić



Opinions of students:

Wanted to have more time for exercises.

Future:

May be better skills for motions (walking).

-> Would change the efforts to cooperative play.

# Thank you!

You are invited to the next RoboCup Competition:

A promotional banner for the RoboCup 2017 competition in Nagoya, Japan. The banner features a stylized robot head logo on the left, composed of geometric shapes and symbols like a gear and a play button. To the right of the logo, the text 'RoboCup 2017' is written in a large, bold, black font. Below this, 'Nagoya Japan' is written in a smaller, bold, black font. Further down, the dates and events are listed: '27 to 30 JULY COMPETITIONS' and '31 JULY SYMPOSIUM'. The background of the banner is a light blue sky with a white cloud, and a portion of the Nagoya Castle is visible on the right side, showing its traditional Japanese architecture with green roofs and white walls.

**RoboCup 2017**  
Nagoya Japan

**RoboCup 2017**

**Nagoya Japan**

27 to 30 JULY COMPETITIONS  
31 JULY SYMPOSIUM

Additional Videos:

Best Goals of RoboCup 2016

*<https://www.youtube.com/watch?v=bD-UPoLMoXw>*