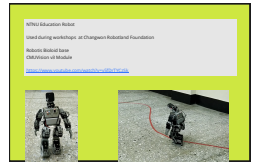
Start here!


NTNU Education Robot
Used during workshops at Changwon Robotland Foundation
Robotis Bioloid base
CMUVision v2 Module

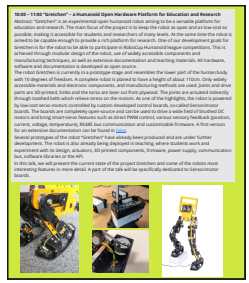

0


A1

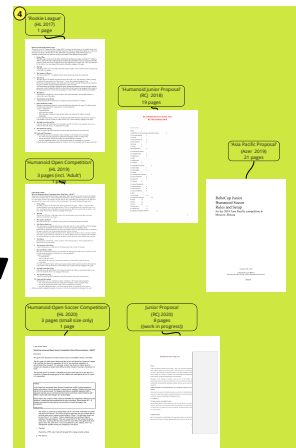

A2


A3


R
RC Junior Demo (2018)
The 'Bottom Line' Robot Exercise (2020)


10:00 – 11:00 "Gretchen" – a Humanoid Open Hardware Platform for Education and Research


3
How should the Humanoid OpenCompetition Robot look?
Idea Description
Contextual situations
Problems to solve
Why?
Value proposition
Restrictions and limitations
Capabilities


4
Rookie League
(ex. 2017)
1 page
Humanoid Junior Proposal
(RC) 2018)
19 pages
Humanoid Open Competition
(ex. 2019)
3 pages (incl. "ADult")
Asia Pacific Proposal
(Acer 2019)
21 pages
Humanoid Open Soccer Competition
(ex. 2020)
3 pages (small size only)
1 page
Junior Proposal
(RC) 2020)
8 pages
(work in progress)


5
How do the Humanoid OpenCompetition Rules look?
Idea Description
Contextual situations
Problems to solve
Why?
Value proposition
Restrictions and limitations
Capabilities
Experienced participants in Junior and Major

A1

"The goal of the RoboCup Humanoid Open Soccer Competition (HOSC) is to present an competition for young researchers interested in humanoid soccer robots.

- Graduating RoboCup Jr.
- Undergraduate students getting started in robotics
- Researchers that are at the moment unwilling to commit to a full RoboCup team

Reduction in resources/man power compared to standard humanoid league

- Single robot competes in the event
- Simplified rule set
- Allow more experimentation and design variation

Make robot soccer fun - research breakthroughs instead of rule fiddling

- Focuses on the essential of soccer: find the ball, dribble the ball to goal, kick ball into goal

In the past

The Humanoid Open Soccer Competition track at the RoboCup 2020 Virtual Humanoid League workshop focuses on two main issues:

1. HOSC robot design
2. HOSC rule design

Organization

Oskar von Stryk:
"I strongly suggest that this opportunity will be used
by all to clarify in person not only

2) the rules of this new competition

but - equally important - also

1) Its goals and target group

For example, is it a new entry for Humanoid League for
research-oriented teams from university labs
or is it a new entry for Junior with education-oriented teams
or ...?

3) Ways of implementation in Bordeaux 2021 and later:

Can it take place on existing fields in HL or in Junior
or does it create new infrastructural needs (which should be
avoided, but available HL fields are already expected to be
crowded)?"

H1

History

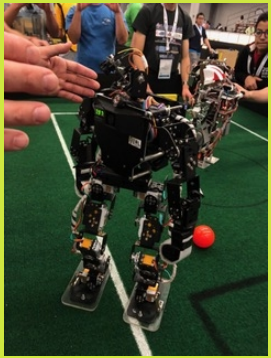
Various proposals from RoboCup Jr and RC HL

Skype Call: 20th March 2020

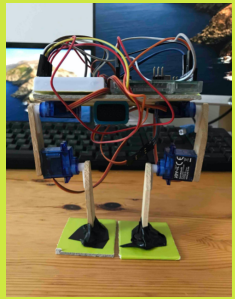
Conclusions

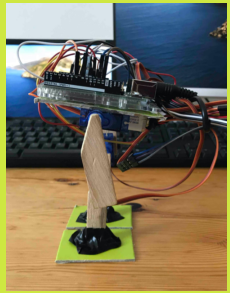
1.) Games with Jr and others, but scored separately
2.) Playing fields are based on HL fields: playing surface is fixed
3.) Lightweight setup of dimension, goals, balls, corner posts, field lines
4.) Encourage interaction by working together during setup time
5.) Organization by RC Jr. and HL

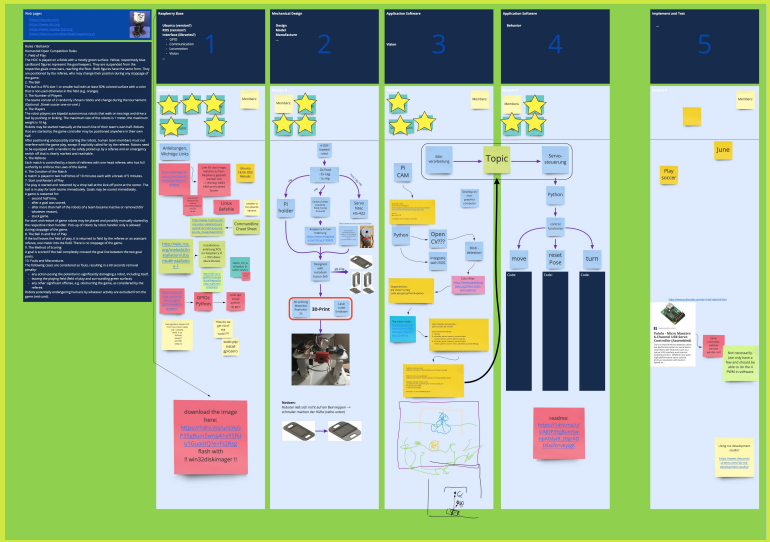
RC Junior Demo (2018)

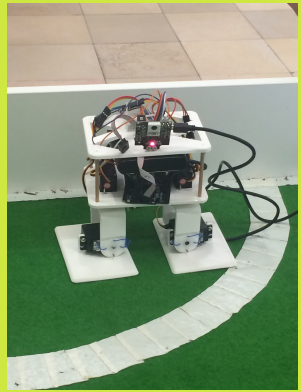


The 'Bottom Line' Robot Exercise (2020)







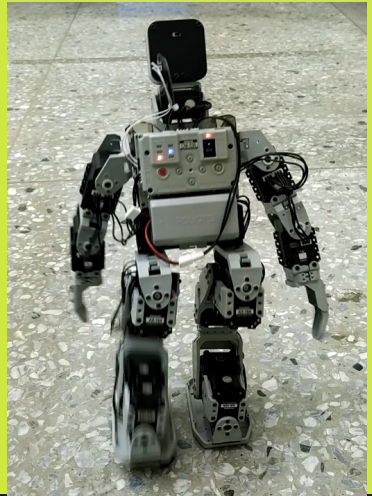


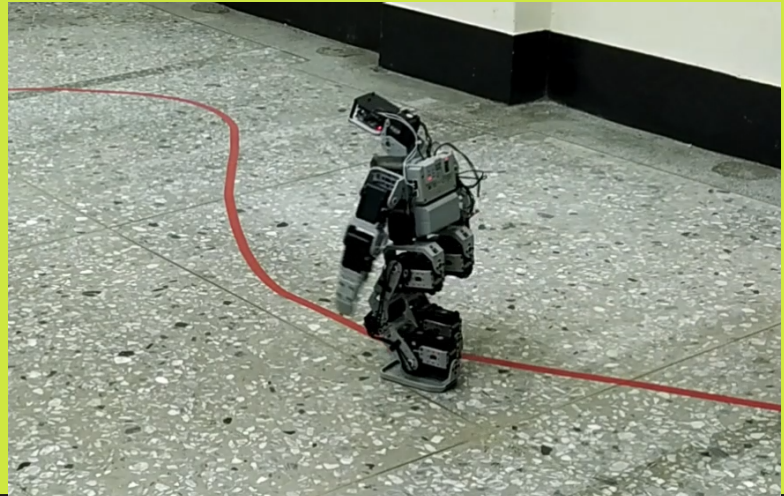
NTNU Education Robot

Used during workshops at Changwon Robotland Foundation

Robotis Bioloid base
CMUVision v3 Module

https://www.youtube.com/watch?v=y5fDrTYCzSk





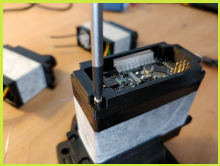
10:00 – 11:00 “Gretchen” – a Humanoid Open Hardware Platform for Education and Research

Abstract: “Gretchen” is an experimental open humanoid robot aiming to be a versatile platform for education and research. The main focus of the project is to keep the robot as open and as low-cost as possible, making it accessible for students and researchers of many levels. At the same time the robot is aimed to be capable enough to provide a rich platform for research. One of our development goals for Gretchen is for the robot to be able to participate in RoboCup Humanoid league competitions. This is achieved through modular design of the robot, use of widely accessible components and manufacturing techniques, as well as extensive documentation and teaching materials. All hardware, software and documentation is developed as open source.

The robot Gretchen is currently in a prototype stage and resembles the lower part of the human body with 10 degrees of freedom. A complete robot is planed to have a height of about 110cm. Only widely accessible materials and electronic components, and manufacturing methods are used. Joints and drive parts are 3D-printed, limbs and the torso are laser cut from plywood. The joints are actuated indirectly through toothed belts which relieve stress on the motors. As one of the highlights, the robot is powered by low-cost servo-motors controlled by custom developed control boards, so-called Sensorimotor boards. The boards are completely open-source and can be used to drive a wide field of brushed DC motors and bring smart-servo features such as direct PWM control, various sensory feedback (position, current, voltage, temperature), RS485 bus communication and customizable firmware. A first version for an extensive documentation can be found in here.

Several prototypes of the robot “Gretchen” have already been produced and are under further development. The robot is also already being deployed in teaching, where students work and experiment with its design, actuators, 3D-printed components, firmware, power supply, communication bus, software libraries or the API.

In this talk, we will present the current state of the project Gretchen and some of the robots most interesting features in more detail. A part of the talk will be specifically dedicated to Sensorimotor boards.



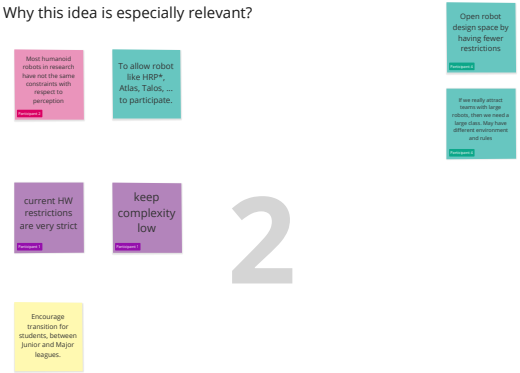
How should the Humanoid OpenCompetition Robot look?

Idea Description

Sketch your idea about the robot (system).

Why?

Why this idea is especially relevant?

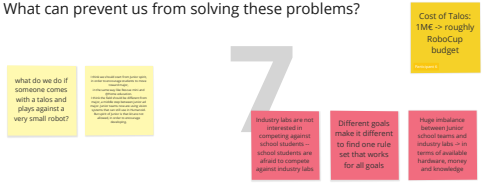


Contextual situations

What do we know about the context (users, place, environment, time, etc.)?

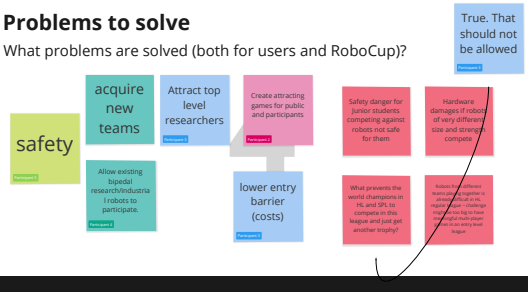
Restrictions and limitations

What can prevent us from solving these problems?



Problems to solve

What problems are solved (both for users and RoboCup)?



Value proposition

What kind of (added) value can be related to the robot?

Capabilities

What aspects of the robot can help us to solve these problems?

4

'Rookie League'
(HL 2017)
1 page

RoboCup Humanoid Rookie League
The games in the RC Humanoid Rookie League (HRL) are played as drop-in games for bipedal robots, with a minimal rule set. Every participating individual or group contributes a single robotic player to a robot team. Scoring is according to the HL drop-in rules. Individuals may participate in the Rookie league for a maximum of three years only and must not have participated in the Humanoid league before.

1. **Field of Play**
   The HRL league is played on the fields of the RoboCup Humanoid League (currently 9 * 6 Meters). Yellow, respectively blue cardboard figures represent the goal keepers. They are suspended from the respective goals cross bars, reaching the floor. Both figures have the same form. They are positioned by the referee, who may change their position during any stoppage of the game.
2. **The Ball**
   The ball is a FIFA size 1 ball with at least 50% colored surface with a color that is not used otherwise in the field (e.g. orange).
3. **The Number of Players**
   The teams consist of 3 – 6 randomly chosen robots and change during the tournament.
4. **The Players**
   The robot players are bipedal autonomous robots that walk on two legs and drive a ball by pushing or kicking. The maximum size of the robots is 1 meter, the maximum weight is 10 kg.
   Robots may be started manually at the touch line of their team's own half. Robots that are started by the game controller may be positioned anywhere in their own half
   After positioning and possibly starting the robots, human team members must not interfere with the game play, except if explicitly called for by the referee. Robots need to be equipped with a handle to be safely picked up by a referee and an emergency switch off that is clearly marked and reachable.
5. **The Referee**
   Each match is controlled by a team of referees with one head referee, who has full authority to enforce the Laws of the Game.
6. **The Duration of the Match**
   A match is played in two half times of 10 minutes each with a break of 5 minutes.
7. **Start and Restart of Play**
   The play is started and restarted by a drop ball at the kick-off point at the center. The ball is in play for both teams immediately. Goals may be scored immediately.
   A game is restarted for:
   - second half time,
   - after a goal was scored,
   - after more than 3 robots of a team became inactive or removed (for whatever reason),
   - stuck game.
   For start and restart of game robots may be placed and possibly manually started by the respective robot handler. Pick-up of robots by robot handler only is allowed during stoppage of the game.
8. **The Ball In and Out of Play**
   If the ball leaves the field of play, it is returned to field by the referee or an assistant referee, one meter into the field. There is no stoppage of the game.
9. **The Method of Scoring**
   A goal is scored if the ball completely crossed the goal line between the two goal posts.
10. **Fouls and Misconducts**
    The following cases are considered as fouls, resulting in a 60 seconds removal penalty:
    - any action posing the potential to significantly damaging a robot, including itself,
    - leaving the playing field (field of play and surrounding green surface),
    - any other significant offence, e.g. obstructing the game, as considered by the referee.
    Robots potentially endangering humans by whatever activity are excluded from the game (red card).

'Humanoid Open Competition'
(HL 2019)
3 pages (incl. 'Adult')
1 page

Laws of the Game
RoboCup Humanoid Open Competition Rules (Small Size) – DRAFT
The games in the RoboCup Humanoid Open Competition (HOC) are played as drop-in[1] games for bipedal robots, with a minimal rule set. Every participating individual or group contributes a single robotic player to a robot team. Scoring is according to the HL drop-in rules. Individuals may participate in the HOC for a maximum of three years only and must not have participated in the regular humanoid league before.

1. ***Field of Play***
   The HOC is played on the fields of the RoboCup Humanoid League[2]. Yellow, respectively blue cardboard figures represent the goal keepers. They are suspended from the respective goals cross bars, reaching the floor. Both figures have the same form. They are positioned by the referee, who may change their position during any stoppage of the game.
2. ***The Ball***
   The ball is a FIFA size 1 ball with at least 50% colored surface with a color that is not used otherwise in the field (e.g. orange).
3. ***The Number of Players***
   The teams consist of 3 – 6 randomly chosen robots and change during the tournament.
4. ***The Players (Small size)***
   The robot players are bipedal autonomous robots that walk on two legs and drive a ball by pushing or kicking. The maximum size of the robots is 1 meter, the maximum weight is 10 kg.
   Robots may be started manually at the touch line of their team's own half. Robots that are started by the game controller[3] may be positioned anywhere in their own half.
   After positioning and possibly starting the robots, human team members must not interfere with the game play, except if explicitly called for by the referee. Robots need to be equipped with a handle to be safely picked up by a referee and an emergency switch off that is clearly marked and reachable.
5. ***The Referee***
   Each match is controlled by a team of referees with one head referee, who has full authority to enforce the Laws of the Game.
6. ***The Duration of the Match***
   A match is played in two half times of 10 minutes each with a break of 5 minutes.
7. ***Start and Restart of Play***
   The play is started and restarted by a drop ball at the kick-off point at the center. The ball is in play for both teams immediately. Goals may be scored immediately.
   A game is restarted for:
   - *second half time,*
   - *after a goal was scored,*
   - *after half of the robots of a team became inactive or removed (for whatever reason),*
   - *stuck game.*
   For start and restart of game robots may be placed and possibly manually started by the respective robot handler. Pick-up of robots by robot handler only is allowed during stoppage of the game.
8. ***The Ball In and Out of Play***
   If the ball leaves the field of play, it is returned to field by the referee or an assistant referee, one meter into the field. There is no stoppage of the game.
9. ***The Method of Scoring***
   A goal is scored if the ball completely crossed the goal line between the two goal posts.
10. ***Fouls and Misconducts***
    The following cases are considered as fouls, resulting in a 60 seconds removal penalty:
    - *any action posing the potential to significantly damaging a robot, including itself,*
    - *leaving the playing field (field of play and surrounding green surface),*
    - *any other significant offence, e.g. obstructing the game, as considered by the referee.*

Robots potentially endangering humans by whatever activity are excluded from the game (red card).

'Humanoid Junior Proposal'
(RCJ 2018)
19 pages

RCJ Humanoid Soccer league rules
RCJ international 2018

Table of Contents

1

'Asia Pacific Proposal'
(Azer 2019)
21 pages

RoboCup Junior
Humanoid Soccer
Rules and Setup
for the 2019 Asia Pacific competition in
Moscow, Russia

October 25th, 2019

Compiled by Azer Babaev
(based on the 2007 version of the rules Humanoid Soccer)

Moscow

'Humanoid Open Soccer Competition'
(HL 2020)
3 pages (small size only)
1 page

Laws of the Game

RoboCup Humanoid Open Soccer Competition Rules (Demonstration) – DRAFT

Motivation

The goal of the RoboCup Humanoid Open Soccer Competition (HOC) is two-fold:

The first goal is to allow teams that would like to join the RoboCup Humanoid League (HL), but find the rules and regulations of the HL too daunting, a platform to demonstrate their research. For example, a team may focus on highly dynamic motions and develop a single robot without a torso instead of having to develop a full team.

The second goal is to present a simplified entry for teams that plan to join the HL in the future. A particular target group for this initiative are participants of the RC Junior (Jr) competition.

Preface

In the RoboCup Humanoid Open Soccer Competition (HOSC), teams prepare a single autonomous robot to compete in robot soccer matches. Robots must look for a ball and try to score a goal. The league shall allow a simplified approach with a lessened learning curve to humanoid robot soccer and allow experimentation with different humanoid designs and technologies.

Robot teams only consist of field players to facilitate the competition. Robots must be designed, constructed and programmed by team members. Robot teams of 2 – 6 players are formed for each game and new teams formed throughout the tournament.

Field of Play

The HOSC is played on a special field built in a way that resembles the actual field for human soccer. The field is of green color and may be covered with an artificial grass with a maximum leaf length of 30mm. The field size should not be less than 6 * 4.5 meters. Yellow, respectively blue cardboard figures represent the goal keepers. They are suspended from the respective goal's cross bars, reaching the floor and cover less than 50% of the goal width. Both figures have the same form. They are positioned by the referee, who may change their position during any stoppage of the game.

1. The Ball

   The ball is a FIFA size 1 ball with at least 50% orange colored surface.

2. The Teams

Junior Proposal
(RCJ 2020)
8 pages
((work in progress))

RC Humanoid Soccer league rules

Preface

In the RoboCupJunior Humanoid soccer league, a team of two autonomous humanoid robots competes against another team in matches. They must look for a ball, trying to score into a color-coded goal in a special field built in a way that resembles the actual field for human soccer. Robots are required to have full autonomy from humans and technical design, and ingenious programming by their developers.

Participants of this challenge are required to give the best of their abilities in programming, robotics, electronics and mechatronics, but also to contribute on teamwork and knowledge sharing with other participants, regardless of culture, age or result in the competition

Design Construction and Programming have to be performed exclusively by the students

Robots must be designed, constructed and programmed exclusively by student members of the team. Mentors, teachers, parents or companies should not be involved in the design, construction, assembly, programming and debugging of robots.

1. GAME PLAY

1.1 Game procedure and length of a game

The RCJ Humanoid Soccer games consists of two teams of robots playing soccer against each other. Each team has two autonomous robots. The match lasts two equal periods of 10 minutes. Players are entitled to an interval at half-time. The half-time interval must not exceed 5 minutes.

1.2 Ball movement

1.2.1 A robot cannot hold a ball. Holding a ball means taking full control of the ball by removing all of its degrees of freedom. Opposing robots must be able to access the ball.

1

	FIFA size 1	Sponge ball	Plastic ball
Diameter	150 mm	80 mm	70 mm
Weight	205 g	28 g	60 g
Rolling distance after kick by Bioloid	0.10 m (estimation)	0.8 m	0.4 m
Rolling distance after kick by Kondo	0.24 m (estimation)	1.6 m 	0.8 m

	Maximum foot elevation in customized gait	Maximum adaptable pile height
Bioloid	15	8 (evaluation)
Kondo	30 mm	15 (evaluation)

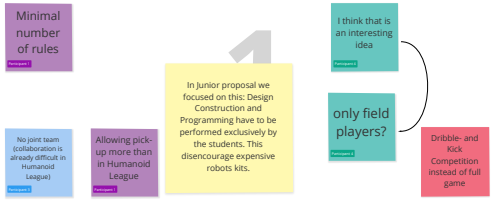
maximum leaf length of 30 mm	**Maximum pile height 3 – 8 mm** 

ROBOT	Weight	Size
Bioloid	1.5 kg	40 cm
Kondo	1.7 kg	45 cm
Bioloid GP	1.6 kg	35 cm
Darwin	3 kg	46 cm
NAO	5.5 kg	57 cm

How do the Humanoid OpenCompetition Rules look?

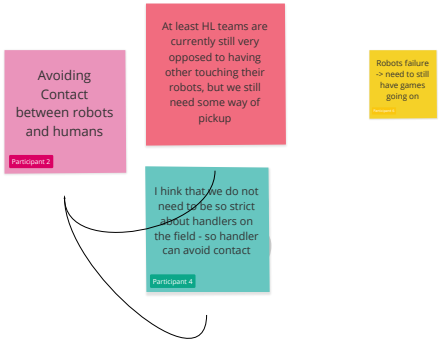
Idea Description

Sketch your idea on the rules in one sentences.



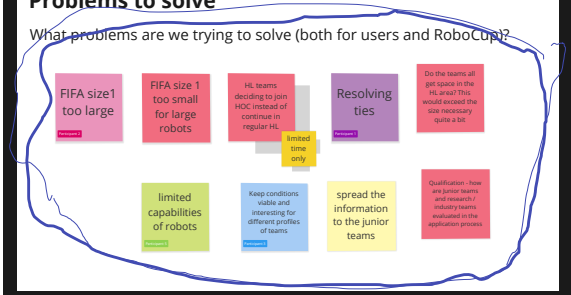
Contextual situations

What user kinds will be affected and how? Are there any other participants in the process? How do these situations affect them?



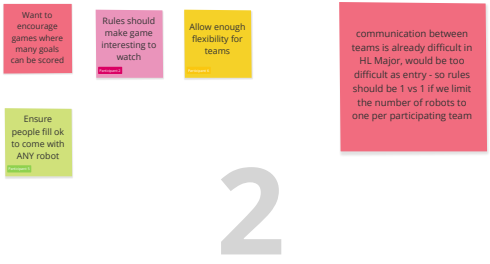
Problems to solve

What problems are we trying to solve (both for users and RoboCup)?



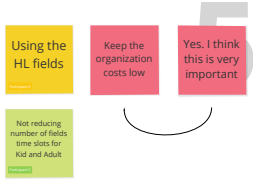
Why?

Why is it important to implement this idea? (both for participants and for RoboCup federation)



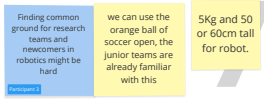
Value proposition

What kind of value are we going to deliver?



Restrictions and limitations

What can prevent us from solving these problems and supporting people in these situations? (what do we have at the moment)



Capabilities

What can help us to solve these problems and support people in these situations? (what do we have at the moment)