Small Size League Roadmap

Milestones discussed in 2003

- Need to shift rules to prevent over-fitting
- Aims
- Pickup games: distributed teams!
- Standard Behavior Language
- Regional competitions

What we did for the milestones

- Need to shift rules to prevent overfitting:
  - No special lighting (2004)
  - No walls around the field (2004)
  - Larger field size (2004)
  - To Avoid arms' race
    - dribbling distance limit (2004)
    - chip kicking limitation (2005)
    - ball speed limit (2007)

What we did for the milestones

- Aims
  - **Full 11 vs. 11 competition on large field without walls**
    - Not realized yet
  - **Local vision**
    - Local vision teams were encouraged, but no such teams now
  - **Autonomous Referee**
    - Referee box (2003)
    - Semi-autonomous referee box (2006)

What we did for the milestones

- Pickup games: **distributed teams like your three robots + my two robots makes a team**
  - Trial: CMDragons + RoboDragons (2004, 5)

What we did for the milestones

- Regional competitions
  - **German Open, Japan Open, American Open, Thailand Open, Latin American Open, Dutch Open, China Open, …**

    We hope more regional competitions.
- Standard Behavior Language
  - Standardized language for team coordination
    - No advances
  - Tie to simulator league Coach system
    - No advances

Beyond 2007 (5 years or less)

- **Things teams/league will do**
  - Encouraging knowledge sharing
    - Software
    - Mechanical and Electrical documentation
  - Shared vision system
    - Preconditions for a reasonable setup on larger fields
    - Makes field changes during tournament easier
    - Shared vision to enable larger field
  - Automatic referee
    - Gameplay is too fast for human eyes
    - Referee robot placing the ball for throw-ins and freekicks
  - Increasing field size
  - Encouraging new teams to join

Beyond 2007 (5 years or less)

- **Research problems**
  - Eliminating sub-markers
  - Cameras on side pole (No overfield cameras)
  - 3D vision system
  - Artificial intelligence and teamwork are the focus of the SSL

A proposal from Japan

- Next generation SSL is proposed from Japan
  - Small size humanoid robots
  - Global vision system with cameras on the side pole attached slantingly.
  - Standard robots
  - Shared vision system

Poster

SSLng : Small size robot league next generation

IS(Intelligent Space) League with Humanoid

1. Feature of New League

Global vision provides accurate information of pitch in real time. Robot team can realize speedy game with high level strategy and team play using these high quality information from vision processing. These technologies are fruit of the small size robot league activities.

Teams in small size robot league can easily participate in the new league with humanoids using their own technologies such as team strategies, building of hardwares, and vision. Since there are some readily available robots which conform to the standard of the new league, we believe participants of the four legged robot league also easily participate.

In the future, we might also be able to have games among other legged league robots, that is, robots in humanoid league and four-legged league.

2. Robot Hardware

Some off-the-shelf small humanoid robots that conform to the technical standards are readily available. Technical committee will announce them as recommended robots. Also, team's can modify them or use their original robots that conform to the technical standards.

(1) Shape : Humanoid robot (a robot with 1 body, 1 head, 2 arms and 2 legs)
(2) Height : Less than 40 cm
(3) Weight : Less than 3.0 kg
(4) Vision : Robots can have local vision(s)
(5) Off-robot computation : Teams are allowed to use off-robot computer(s). Robots and computers can communicate using wireless LAN.
(6) Number of robots in a team: 5 or less

3. New Global Vision

A new distributed street-lamp style camera system is introduced instead of the conventional overhead view system currently used in SSL.

Shared vision system is provided by the organizer of the competition. The system includes cameras and an image processing PC. Teams can use the output of the vision server on the PC, that is, positions/orientations of the ball and robots. Teams are allowed to use their own vision system including cameras if they want.

Definition of the Distributed Street-Lamp Style View System:

(1) Number of cameras: 4 units
(2) Position of cameras: 2m above from the field
(3) Type of official cameras: high resolution color camera
(4) Team cameras: teams can put their own cameras near by official cameras
(5) Output of official vision server: positions/orientations of the ball and robots

The intelligent space is expected to be one of the most important technologies to make robots can play active roles in real world. The lamp-style view is a key to make intelligent space into reality. Then we believe that the technologies developed in the new small size robot league will be applied to many applications in the future.

4. Field and Ball

(1) Field Size : 2900mm x 2400mm (former size of small robot league)
(2) Extra space around the field: some extra space (about 0.5m to 1m) is required between lines and side walls for the safety issues.
(3) Ball : Not yet determined. We would like to chose a ball easily available everywhere in the world like an yellow tennis ball.

5. Others

To motivate scientific contribution of the teams, every teams are encouraged to publish a technical report which shows details of the team technologies. The technical committee investigate the report for the next year's qualification.

We call for opinions to build rules for this new small size robot league. The rules will be built upon current rule books of SSL and humanoid league.

We believe this proposed new small size robot league contributes as the next step to the ultimate goal of RoboCup that the humanoid team wins against the humans world champion team by 2050.

RoboDragons, Owaribito-CU,

Demonstration Video

- Demonstration video footage is here.

- We should carefully discuss the proposal.