Lessons Learned
from Fukuoka 2002 Humanoid League

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1 Rules

1.1 Performance Factors

We would like to trigger developments towards fully autonomous self-build humanoid robots. Therefore we took so-called performance factors for the different dimensions with regard to autonomy (external power cord, computer outside robot, remote control). Each were to be 1.2 and if more then one is applicable then they are multiplied (1.2, 1.44, 1.728, 2.0736). These factors were either used as penalty factor (e.g. in the walking the time was multiplied by them) or as handicap (in penalty kicking the score was divided by them). I think that they are working quite well (with regard to the above stated intention) and will certainly prefer the more autonomous robots but will also allow for semi-autonomous ones if their performance is much better then that of the autonomous ones. No changes needed.

1.2 Changing Rules

Because it was the first time we had the humanoid league it was accepted that we changed the rules in accordance with the affordances of the challenges and the problems we experienced there. But at Padua we should have a meeting in the beginning with all team leaders and find out with what exact set of rules everybody has to live with during the competition. We should avoid changing the rules as much as possible.

2 Challenges

2.1 Stand on One Leg

This is definitely no problem for most of the humanoid robots or it shouldn't be one while it is one for humans! It is a wonderful entry if the audience is also involved in this. It was done in Fukuoka by asking everybody in the audience to perform this challenge together with the robots.

2.2   Walking

We developed partially the rules during the team leader meetings in consensus. Roughly they have a tendency to prefer those robots which have a good ratio between weight, power, and gait width. It is up to now fair to the different physical heights of the robots because the lenght of way is 5 times its physical height. Every touch of a human during the walking gives a penalty which is linearly increasing: 20 sec/1st touch, 40 sec/2nd touch, 60 sec/3rd touch etc. The suggestion from participants is to ask for a proof for each robot that it is capable to walk at least the 1st sector in the walking competition as a prerequisite for taking part in the competition.

2.3   Penalty Kick

Again the physical height of the striking robot was used to determine the distance between ball and striker while the measurements of the goals were only available for the two categories (40 cm and 80 cm height). We had to change the roles how the movements of the goalie and the striker are related to each another, first, to give the striker a realistic chance we introduced a 5 sec latency after the starting whistle before the goalie may start to walk towards the ball to reduce the angle which could be used to score a goal. Second, the line of the goal area was used a astrict demarcation line so that striker and goalie do not touch each another. We had some problems with the ball and the field. The ball was big enough but it was so light that it often went astray due to small uneven parts in the field.

2.4   Free Style

This turned out to be very entertaining and also very demanding for the teams.

3   Scheduling and Dissemination of Information

All in all for walking, penalty kick, and free style the time schedule turned out to be overly optimistic with regard to the set-uptime needed. While the teams in charge were very busy, everybody else including the audience had to be entertained. This was this year done perfectly by Hajime Asama and a professional moderator in Japanese. To ease this job, a suggestion could be that every team sends in a CAD-animation in which the construction of the robot is explained and a video on which the performance of the robot in the laboratory is demonstrated. Both could be demonstrated during set-up time and one of the team members may serve as an interview partner. In any case the live moderation made it interesting and we shouldn't give it up instead of the videos but integrate them. They can perfectly go together. It was also good, when the robots were brought as close as possible to the audience so that they could get a closer look - and better photos, before the robots start in a challenge.

4   Environment for Challenges

There is the proposal to synchronize the constraints for the environment (colours used, floor, lighting, etc) with another league namely the 4-legged robot league. I will get in contact with those in charge for the small-size league. It was also requested by the participants to have an extra space for rehearsal and practicing. The stage itself was always occupied by Asimo or by those teams in an actual challenge. The booths were for most of the teams OK but there was absolutely no space for rehearsal.

5   Organisation

As far as I have observed all the teams were highly satisfied with the local support and their booths. Many thanks has to go for Junichi Itakura who was acting in a very competent, most friendly, and calm way. We have to ensure that in Padua we will have a similar competent and responsible person.

The Technical Committe is in the process to be set up. Minoru Asada already stated some names. I will contact all of them during this week.

The **IEEE-RAS** International Conference on Humanoid Robots is taking place biannual in autumn. Last one was at Waseda University[1]. The next will be in 2003 in Karlsruhe and Munich (Germany). General chair is Alois Knoll (TU München) and local chair is Rüdiger Dillmann (Karlsruhe). I will talk with both to make them aware of the Humanoid League in RoboCup and find a way how to collaborate. E.g. the participants in the humanoid league should be willing to submit a co-authored paper for this conference to present the humanoid league as well as advertising the RoboCup event.

There was a suggestion of participants with regard to register a humanoid for RoboCup, namely to ask for more specific technical data e.g. length of legs, corpse, head, arms, foot print, weight, time for set-up, life time of battery. This may help us to make much better suited distinctions between the classes and fine tune the rules etc for the next RoboCup. So, this is in addition to the list, Minoru Asada already distributed in his last mail.

We should also try to attract all research groups working on humanoid robots and "modules" (like humanoid arms, hands, legs, or vision) to come to RoboCup and exhibit their systems even if the do not take part in the competitions. So, let me ask you to spread the information about the Humanoid League at Padua.

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[1]   check `http://www.humanoid.waseda.ac.jp/Humanoids2001/`

Appendix: Results

Table 1. Best Humanoid Award

1	NAGARA	Gifu Industries Association	Japan

Table 2. Results: Humanoid Walk

1	NAGARA	Gifu Industries' Association	Japan
2	Robo-Erectus	Singapore Polytechnic	Singapore
3	Foots-Prints	individual	Japan

Table 3. Results: H-40 Class Penalty shoot

1	Foots-Prints	individual	Japan
2	Tao-Pie-Pie	University of Auckland	New Zealand

Table 4. Results: H-80 Class Penalty shoot

1	NAGARA	Gifu Industries Association	Japan
2	Osaka Univ. Senchans	Osaka University	Japan

Table 5. Results: Free Style

1	Southern Denmark	The Maersk Mc-Kinney Moller Institute for Production Technology	Denmark
2	NAGARA	Gifu Industries Association	Japan
3	Tao-Pie-Pie	University of Auckland	New Zealand