

HUROCUP: Weight Lifting Laws of the Game 2007

Jacky Baltes
Autonomous Agents Laboratory
University of Manitoba
Winnipeg, Manitoba
Canada, R3T 2N2
Email: jacky@cs.umanitoba.ca
WWW: <http://www.cs.umanitoba.ca/~jacky>

January 4, 2007

Abstract

The following rules and regulations govern the Weight Lifting event in HUROCUP, a robotic game and robotics benchmark problem for humanoid robots.

Latest Version of the Rules for HuroCup

The latest official version of the rules of the game for HUROCUP is always available from the FIRA HUROCUP website (<http://www.fira.net>).

1 Weight Lifting

The goal of the weight lifting competition is to encourage research in actively balancing and carrying robots.

2 Changes in the Laws of HuroCup for 2007

The year 2007 marks a big change in the history of HUROCUP as it will be the inaugural competition for the HUROCUP, which greatly increases the status and scope of humanoid robotics competitions within the FIRA framework.

3 Laws of the Game: Weight Lifting

The following laws describe the specifics of the weight lifting event. For general specifications relevant to all HUROCUP events (e.g., robot dimensions, playing field and lighting, responsibility of the referees) please refer to the general HUROCUP laws.

WL-1 The Field of Play

- WL-1.1. The weight lifting competition is played on a field with a minimum dimension of 1.8m by 1.8m.
- WL-1.2. There are three lines marked on the playing field: (a) the start line, (b) the lift line, and (c) the final line. The distance between the start line and the lift line and the lift line and the finish line is 30cm for small robots and 50cm for large robots.
- WL-1.3. Teams may place small coloured or infra red markers in the area behind the end zone to guide the robot as long as they do not interfere with other teams.

WL-2 The Lifting Bar and the Weights

- WL-2.1. The lifting bar is a wooden, metal, or plastic bar with a width between 8 mm to 15mm. Two stops are used to mount the weights. The distance between the inner stops is 30cm. The total length of the lifting bar is between 40 - 50cm.
- WL-2.2. The “weights” used in the competition are standard 5 1/4 inch CDs or DVDs that must be lifted by the robot as seen in Fig. 1.

WL-3 Number of Robots

- WL-3.1. A single robot competes in a match.

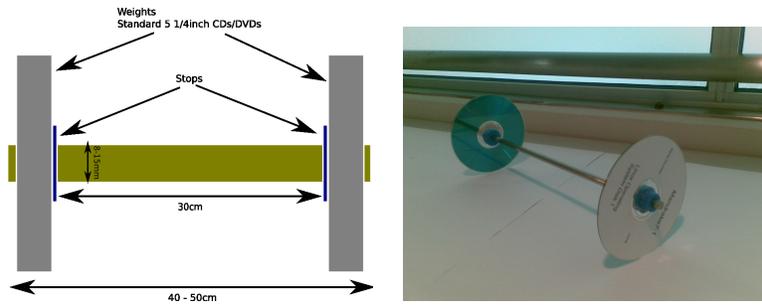
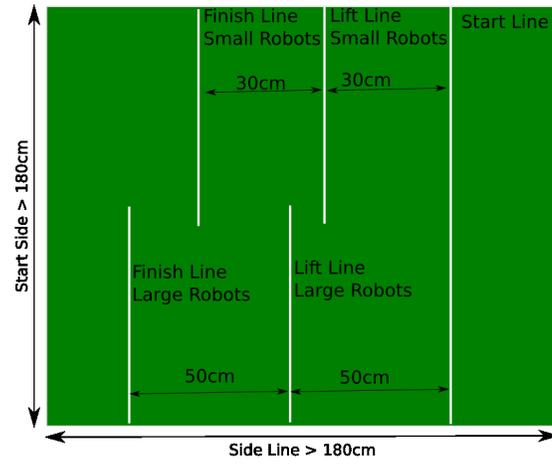


Figure 1: Lifting Bar: A schematic and a picture of a possible lifting bar.

WL-4**The Players**

Please refer to the general HUROCUP laws for a description of the players.

WL-5**The Referee**

Please refer to the general HUROCUP laws for a description of the referee.

WL-6**The Assistant Referee**

Please refer to the general HUROCUP laws for a description of the assistant referee.

WL-7**Game Play**

- WL-7.1. A single robot is designated the lifter. All other robots must be outside of the playing field.
- WL-7.2. The only robot allowed to move during a run is the designated lifter.
- WL-7.3. The lifter will be placed behind the start line.
- WL-7.4. At the beginning of the try, the team will inform the referee how many CDs the team wants to attempt to lift and the referee will attach the desired weight to the lifting bar.
- WL-7.5. The referee will signal the start of the competition by blowing the whistle.
- WL-7.6. After the referee gives the start signal, the robot must cross the lifting line while carrying the weight below head height of the robot.
- WL-7.7. While touching the lifting line, the robot must lift the lifting bar above its head. The height difference between the low and high position must be at least 10cm.
- WL-7.8. While keeping the lifting bar above its head, the robot must continue to walk towards the finish line. A lift is considered successful if the robot crosses the finish line with the weight above its head.
- WL-7.9. A robot is not allowed to leave the playing field.
- WL-7.10. Each robot may have at most one human handler associated with it.
- WL-7.11. The human handlers are not allowed to interfere in any way with other robots, the referee, or other human handlers.
- WL-7.12. A human handler may only enter the playing field or touch his/her robot with the permission of the referee.
- WL-7.13. The end of the competition is signaled by the referee by blowing the whistle a second time. The referee terminates the competition if

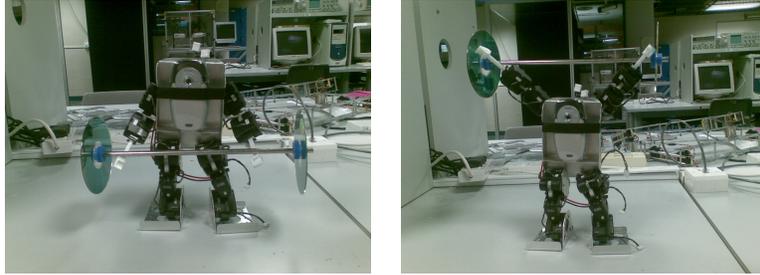


Figure 2: A robot carrying the lifting bar below and above the head.

- the robot has successfully crossed the finish line,
- the robot was unable to complete the try within 2 minutes,
- the robot falls and is unable to get up on its own or is immobilized by a technical defect,
- the robot leaves the playing field,

WL-7.14. A robot may continue in the competition as long as it has failed less than three tries. When the robot will be declared the lifter in the next round, then the team may choose a new weight for the next try.

WL-7.15. At the end of the try, another robot will be designated the lifter.

Decisions

Dec-7.1. The organizing committee has decided to simplify the competition for the year 2007. In 2008, the lifting bar will be placed on the lifting line and the robot must walk and pick up the lifting bar with the weights on its own.

WL-8

Fouls and Misconduct

WL-8.1. The lifting bar is below the head of the robot while it traverses the zone between the lift line and the finish line.

WL-8.2. The robot handler touches the robot.

WL-8.3. Any infractions as listed by the general HUROCUP laws as far as they are applicable in this event.

WL-8.4. Any team that commits one of the infractions listed in WL-8.1 and WL-8.3 will be penalized by having the try declared invalid.

Place	Points scored
1 (Winner)	10
2	8
3	6
4	4
5	3
6	2
7	1
8, 9, ...	0

Table 1: Point allocation for placings in the HUROCUP events.

WL-9

Method of Scoring

WL-9.1. All robots that have not lifted successfully at least 0 CDs are automatically awarded no rank and 0 points.

WL-9.2. Among the robots that have lifted more than 0 CDs, the robots are ranked (i.e., 1st place, 2nd place) based on the maximum weight lifted successfully.

WL-9.3. The point allocation for robots is as follows:

- The first ranked robot is awarded 10 points.
- The second ranked robot is awarded 8 points.
- The third ranked robot is awarded 6 points.
- The fourth, fifth, sixth, and seventh place robots are awarded 4,3,2, and 1 point respectively. A summary of the point allocation for placings is shown in table 1.

WL-9.4. In case of a tie between n robots with rank k , all robots will be awarded rank k and receive the average of the scores for ranks k to $k + n$. For example, if the robots A, B, C, D scored 10, 8, 8, 4 goals respectively, then robot A will be declared the winner (1st place) and receive 10 points, both robots B and C will be declared 2nd place finishers and receive $(8 + 6)/2 = 7$, and robot D will be declared the fourth place finisher and receive 4 points.