

FIRA Youth - Laws of the Game

City Racer

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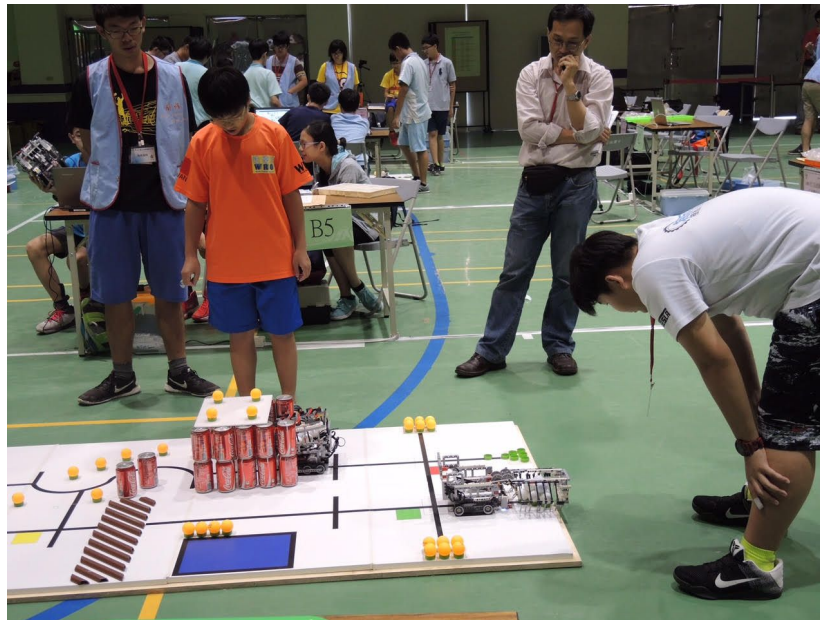
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Abstract

The following rules and regulations govern the city racer event of the FIRA Youth Competition - an event for junior and high school students to expose them to robotics problem solving and to spark their imagination.

Latest Version of the Rules for City Racer

The latest official version of the rules of the game for City Racer is always available from the [FIRA Facebook Page](#).

Changes to the City Racer rules of FIRA Youth

The city racer competition will be organized for the first time in 2017.

City Racer

The goal of the city racer competition is to design a challenging and interesting environment for U14 and U19 students. Students develop a robot that can track a line, manipulate small objects, and traverse uneven terrain.

City Racer - Laws of the Game

The following laws describe the specifics of the city racer event. For general specifications relevant to all FIRA Youth events (e.g., robot dimensions, playing field and lighting, responsibility of the referees) please refer to [General - HuroCup Laws of the Game](#).

[CR-1]: Field of Play

[CR-1.1]: The city racer competition is played on a field with a minimum dimension of 3.5 m by 1.5 m. See Fig. [City Racer Field](#).

The sports field (court) will be composed of 9 pieces 600 mm square white foaming board and 10 mm high, the black line will be 18mm wide, might be arranged as the picture above. The arrangements could be changed by the referees. The field will have different kinds of material ex: woods, plastic...etc, and will be colored for a different mission.

[CR-1.2]: The field divided into 9 areas. B and F area are the required missions area, included T1, T2 , T3 color cards (T1, T3 are for directions and T2 is for the number of laps, the referees will announce the details. For example, a red card on T1 may mean turn right at the next intersection or yellow on T2 may mean three laps in total, whereas red on T2 may mean 1 lap only). Area C is the area for weight lifting. robots are required to lift the barbell and put it in the target position. Area D and area E are for the track field event. (The referees will announce the meaning of the T2 cards - how many laps the robot must follow around the track). Areas G and G1 are for football. The card T4 indicates the target area for the shot. A ping pong ball will be used as ball and placed on penalty marker; G1 is the goal area with three different directions. Area H is the jumping pit. Area I is the goal.

City Racer Field

[CR-2]: The Lifting Bar and the Weights

[CR-2.1]: Barbell

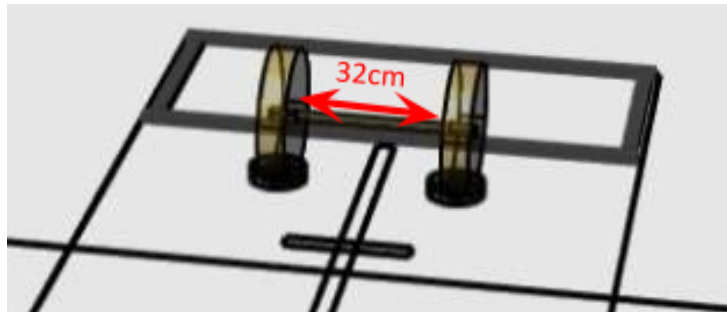
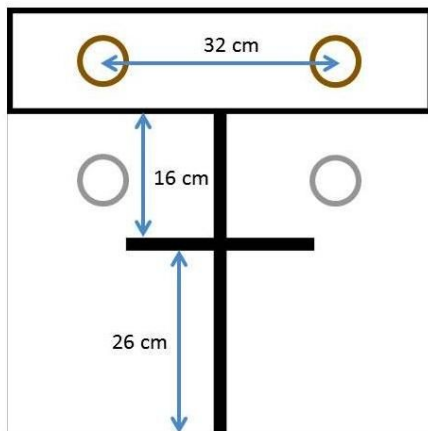
The barbell is a bolt (about 9 mm, made from iron, length: 40 cm, weight: 270 grams) plus two screw nuts and two plates, total weight: 370 grams. Weight: CD-R*2 (Diameter: 12 cm, 1.2 mm thickness, 17 grams). Barbell's base: the base will use 1.2 cm width tape (diameters: 7.6 cm) then put it horizontally on each side (as the picture above). The barbell has 3 different level weight:



- (1) Feather level: each side with two CDs, taped with blue tag
- (2) Light level: each side with four CDs, taped with orange tag
- (3) Heavyweight level: each side with six CDs, taped with red tag

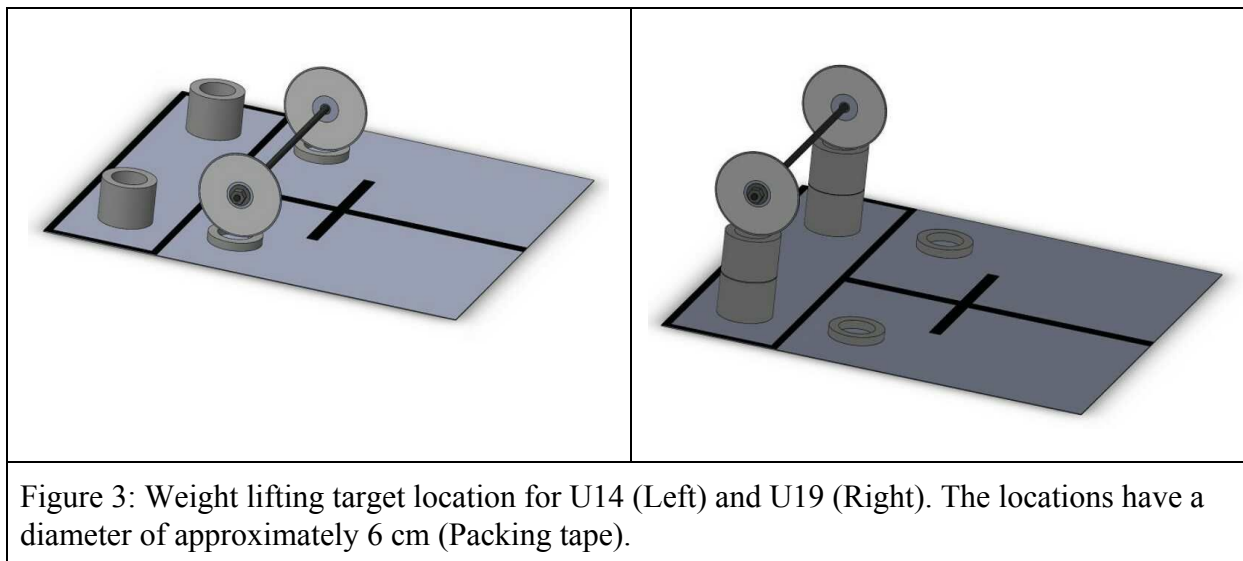
[CR-2.2]: The lifting bar is a wooden, metal, or plastic bar with a width between 8 mm to 15 mm. Two stops are used to mount the weights. The distance between the inner stops is at least 40 cm. The total length of the lifting bar is between 50 cm to 80 cm.

[CR-2.3]:] 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 Figure [Lifting Bar](#).



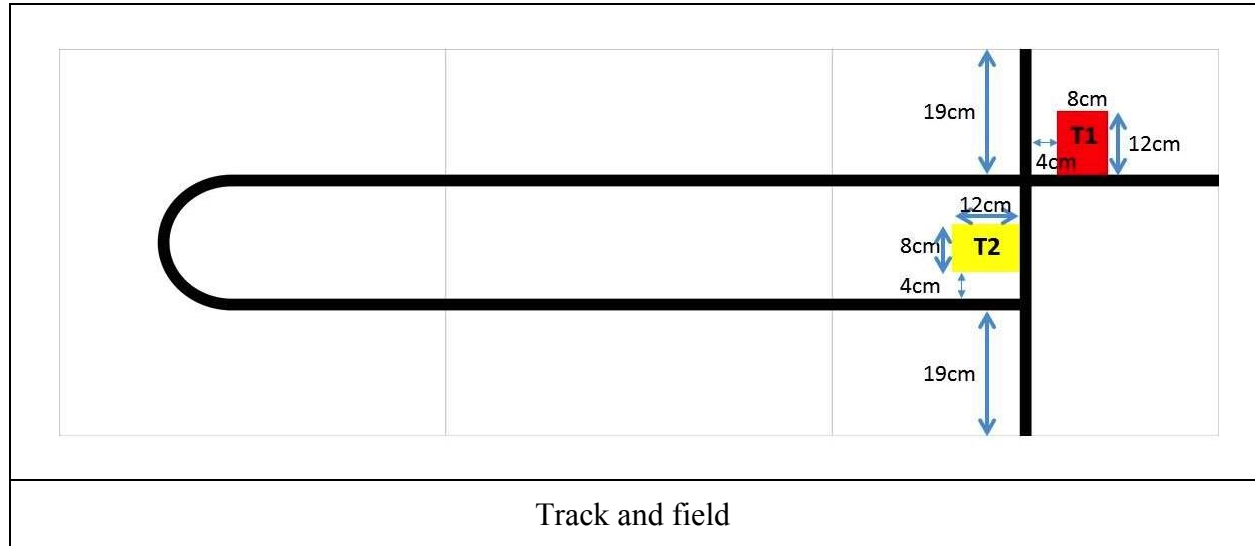
Barbell description

[CR-2.4]: Lifting height level: \$WLH. The lifting bar must be put on a target location \$WLD in front of the middle of the barbell.



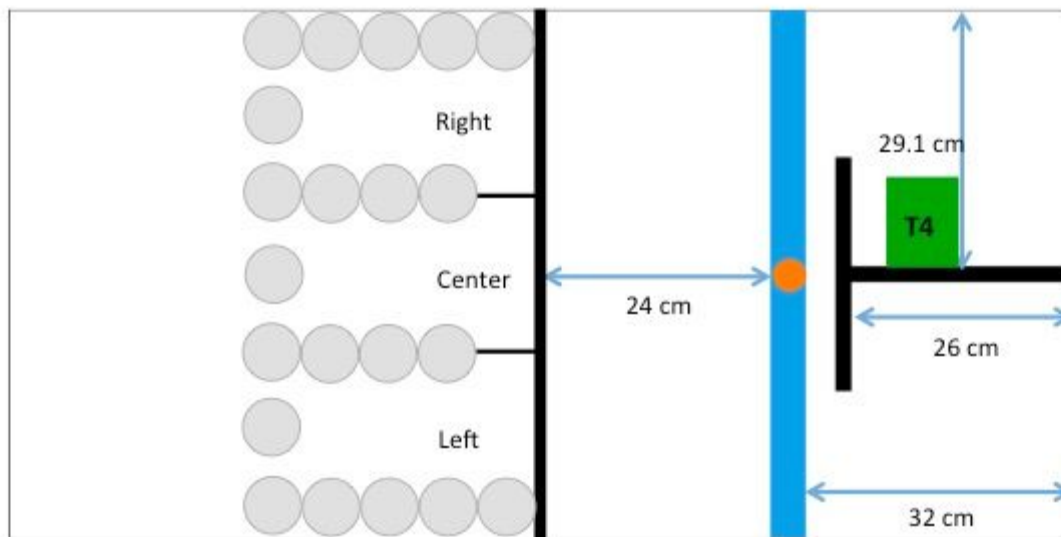
[CR-3]: Track and field

The track and field event uses colored cards with the following colors: red, yellow, or green. T1 and T2 will put at the intersection's right side. The color of the card indicates the direction at T1 and T3. For example, color1 may mean turn right. The referees will announce the exact color and its meaning before the competition. T2 uses one of three colors to indicate the number of laps.



[CR-4]: Shoot football(ping pong ball) and field

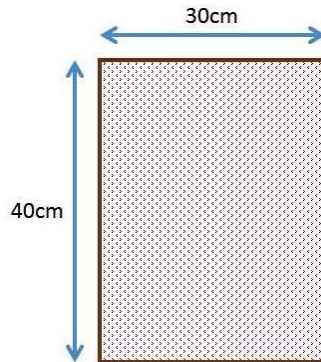
The referees will announce T4 card's color which is for the shooting direction. The gate is made from 10 aluminum cans (330 ml). Ping Pong ball will be put on the bottle top (3.2 cm*1.2 cm), ping pong's size is 4 cm.



[CR-5]: Jumping pit

The field's size: 300 mm*400 mm, made from PVC board (thickness of 2 mm), surrounded by phone wiring duct type 3. The jumping pit will be filled with 3 mm to 8 mm plastic balls (200 g to 600 g, measure by the size and weight of balls, the referee will decide)

H area will put aluminum cans each side, the referees will announce the quantity.



Except the starting and the goal area, others will be white. The venue's black trajectories' have a width of \$L.

The robot must cross the jumping pit from one side to the other. It is only allowed to enter and leave the field from the 40cm wide side lines

[CR-6]: Number of Robots

[CR-6.1]: A single robot competes in a match.

[CR-7]: The Players

[CR-7.1]: The robot in its maximum extension must fit into a cube of size \$RL by \$RL by \$RL.

[CR-8]: The Referee

[CR-8.1]: Please refer to [General - HuroCup Laws of the Game](#) for detailed information about the referee and his or her duties.

[CR-9]: The Assistant Referee

[CR-9.1]: Please refer to [General - HuroCup Laws of the Game](#) for detailed information about the assistant referee and his or her duties.

[CR-10]: Game Play

The referees will score each sports items by performance of the robots.

[CR-10.1]: Sports Items

1. The robots start from A area, any part of the robot cannot cross this area before the referee has started the trial by blowing the whistle. The robot must be placed completely in the starting area.

2. B area: the required missions' area, T1 is for the sports, T2 is for number of laps.
3. C area is for lifting. Robots are required to lift the barbell and put it in the certain position. Different age classes have different target height.
4. D and E area are for the track and the field; follow the direction from L1 to L5.
5. F area: the required missions' area, follow T3 card's instruction.
6. G and G1 area for football, T4 card is for shooting direction.
7. H area is the jumping pit.
8. The robots should be stopped at I area (red zone).
9. The referees will announce all the colored cards' content.

Different groups' sports item detail will be announced by the referees. The sports item will be announced before the assemble time and will announce the colored cards color and position before each round.

[CR-10.2]: The maximum time for one trial is 5 minutes.

[CR-11]: Method of Scoring

Scoring: Sport items points and time points; the referees will score each performance of the robots.

[CR-11.1]: The field will divide into 9 major squares, after pass each part will have one score. The robots need to finish the sports items by order.

[CR-11.2]: A area: started from here, will get 50 points after getting in the B area.

[CR-11.3]: B area: the referees will announce T1 and T2 colored card, the robots should complete the T1's instruction can get 50 points.

[CR-11.4]: C area: If the robot successfully lifts the weight bar off the ground, it will receive 20 points.

Group/Height	Pioneer	Explorer
Weight	\$H	\$H
Feather	50 points	50 points
Light	70 points	70 points
Heavyweight	100 points	100 points

[CR-11.5]: D and E areas: The referees will announce T2 card, the robot should run from L1 to L5 in order as a round. Each section is worth 10 points. If complete the goal will get total 100 points, if not will get 70 points.

[CR-11.6]: F area: The referees will announce T3 card. If the robot successfully completes area F and enters the next area, it will receive 50 points.

[CR-11.7]: G area: If the robots kick the football off the base will get 20 points. Kick into a goal which is not as requested will get 50 points, into the goal will get 100 points. After football and

get in the F area will get another 50 points.

[CR-11.8]: H area: the robots can leave jumping pit will get 50 points also only can push out a maximum of 10 plastic balls. If more than 10 balls will minus 2 points for each.

[CR-11.9]: I area: The robots get into red zone completely and stop will get 50 points. If cross over the red zone will get 30 points.

[CR-11.10]: If the robots didn't pass any area or not follow the order rules won't get any points on.

[CR-11.11]: The referees will finish the game as long as the competitor's touching the field or the robot couldn't follow the rule, time's up or the robot couldn't finish the game.

Time points

1. Can only get the time points as long as the robots finish the sports items by itself on time, if not, the sports items score still can be counted but not the time points.
2. Timing points: 120 secs – (total finishing time(sec))

Scoring

1. Every round score will have sport mission points and time points.

[CR-12]: Fouls and Misconduct

[CR-12.1]: The robot handler touches the robot.

[CR-12.2]: Any infractions as listed by [General - HuroCup Laws of the Game](#) as far as they are applicable in this event.

[CR-12.3]: Any team that commits one of the infractions listed in this section will be penalized by receiving 0 points for the trial.

[CR-13]: Ranking and Tie-Breaker

The ranking of the teams is according to the following procedure:

1. The highest score of two rounds, if the score are same then
2. Compare with the second high score, if same then
3. Compare the time of the highest score round (shortest win), if the time is same then
4. The weight of the robots (lightest win)