robotex International

SORTING CHALLENGE (PROBLEM SOLVING)

COMPETITION COORDINATOR

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1 Introduction

The goal of this competition is to create an autonomous robot capable of sorting balls of different colors and delivering them to a designated area. The restrictions on building the robot are size, weight and budget.

2 Competition Field

1. The Competition area is approximately 3000 x 3000 mm.
2. There is a 15 mm wide black line around the competition area.
3. Field color is white.
4. The competition area contains: randomly placed balls, 2 different colored sorting zones, randomly placed black obstacle walls (With height of 10-20 cm), 2 different home zones.
5. At the 2 different corners of the competition area, there is a home zone approximately 400 x 400 mm in size.
6. Home zone is marked as 400 x 400 mm green box (HEX: #00a651, CMYK green).
7. At the 2 different corners of the competition area, there are differently colored sorting zones approximately 700 x 700 mm in size.
8. One sorting zone is marked as 700 x 700 mm blue box (HEX: #2e3192, CMYK blue), second sorting zone is märked as 700 x 700 mm red box (HEX: #ed1c24, CMYK red). **Both zones have an outer wall on two sides,** with a height ranging from 7 to 20 cm.
9. At the competition area there are 10 randomly placed blue and red colored balls, each surrounded by a 15 mm wide line marking balls position on the field. Beneath each ball is an loose base that holds the ball in place.
10. The ball has a diameter of 7 cm. It weighs approximately around 0,5-3 grams. Material: Polyethylene (PE), plastic.

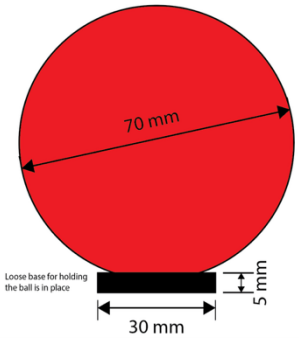


Image 2 – Ball dimensions

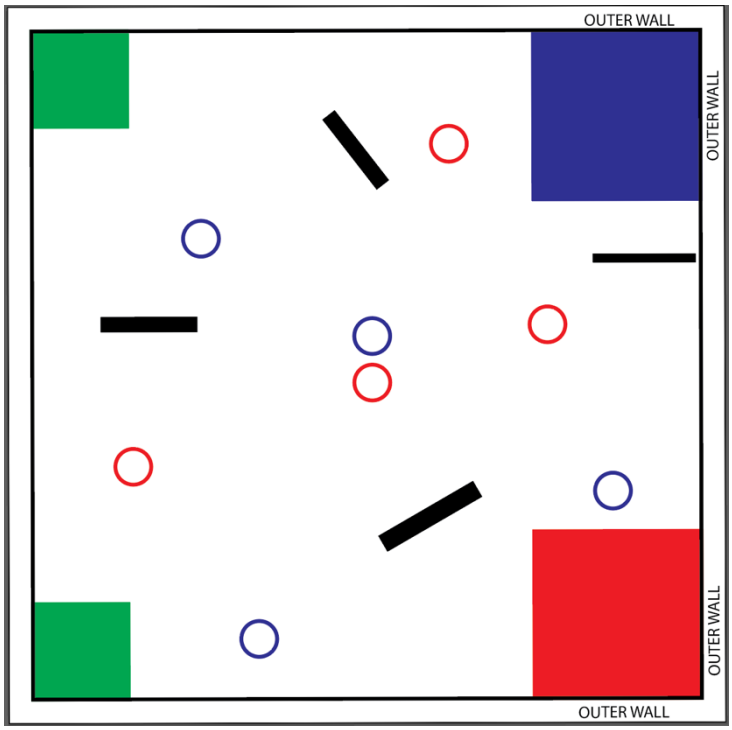


Image 1 – example competition field

3 The Criteria for Robots

1. The robot must be autonomous.

2. The maximum dimensions of the robot during starting position are 20 x 20 x 20 cm and mass 2 kg.

3. The robot may increase in size after starting up to +10 cm to all dimensions (meaning the robot can increase its size to be 30 x 30 x 30 cm after the start).

4. The maximum budget for building the robot is 250€ (VAT included). The price of components must be shown and submitted as a separate table. The components that the team possessed before the challenge must be assigned a value that is equal or near to the market value of those components. **NB! If the jury sees that the cost of building the robot clearly exceeds the budget, the jury reserves the right to disqualify the team from competing.**

5. These criteria also prohibit the usage of study robots such as LEGO NXT, EV3, Spike as well as Makeblock mBot etc.

6. The cost of simpler structural elements is not counted towards the budget, such as 3D printed elements and plywood / plex glass details.

7. The robot cannot damage the competition field nor be dangerous to spectators.

8. The robot cannot use a voltage higher than 24 V.

9. The robot must have a start / stop button or a remote controller to start and stop the robot.

4 Competing

1. The competition takes place in 3 rounds. Each team has 1 attempt per round.
2. The team who gathers the most points wins. The points are distributed in the following manner:

Operation	Points
Delivering the ball to the correct colored sorting zone	+5 points for each ball.
Finishing before maximum completing time	+10 points for each **full** 10 seconds.
Delivering the ball to the wrong colored sorting zone	-5 points for each ball.
Leaving the ball on the field	0 points for each ball.

3. The robot will be inspected by a jury pane which awards a maximum of +20 points for the following criteria:
    - General solution and budgeting: **5 points**
    - Software design and solution logic: **5 points**
    - Teamwork and work distribution: **5 points**
    - Design (visual aesthetic and cleverness in design): **5 points.**
4. **Points are summed up from all three rounds and the jury points are added on top of this score.**
5. The competition refree determines the home zone from which the attempt begins.
6. The robots must start their attempt on the command of the competition refree.
7. The robot must start moving a maximum of 3 seconds after the start command. If the robot does not start moving within 3 seconds of the start command, the attempt is counted unsuccessful and equals as 0 points for this round.
8. The maximum time for completing all assignments is 3 minutes. Surpassing this limit all other actions are discounted towards the attempt.
9. If the robot delivers all the balls to the correct sorting zone before the three minutes have elapsed and returns completely to one of the home zones before time runs out, the run ends early, and the robot earns bonus points for each full 10 seconds remaining from the maximum run duration. (The points table is above)
10. If the robot drives fully out of the field border line, attempt ends and the robot receives points according to the points table, except for the remaining time.
11. A competitor may also choose to end the attempt prematurely; in this case, the robot receives points according to the points table, except for the remaining time.
12. **One team can have up to 5 team members + 2 mentors.**

5 Organization

1. The organizers do their best to ensure smooth lighting conditions during the competition, however they cannot guarantee an arena without shadows with perfectly distributed lighting conditions. **The arena has at parts uneven lighting and infrared noise, which may disrupt the work of sensors during the competition. For this reason, the organizers recommend using covers or blinds for sensors, testing the sensors under intense lighting conditions or even under direct sunlight to imitate the lighting conditions of the competition arena.**
2. The robot must be registered before the competition. The registration process includes technical inspection of the robot, marking the robot with a number sticker, and the order number will be drawn.
3. Technical inspection must be completed by the time that is specified by the organizers.
4. All questions and problems arising during the competition are solved by the referee.
5. The final decision regarding any appeals is made by the referee and/or the organizers. All complaints must be reported to the referee during the match or right after the ending of the match. Complaints filed later will not be accepted. The final decision regarding any disputes or inconsistencies is always made by the referee.

6 Amendments to rules

Changes and amendments to the rules are made by the competition coordinator according to the competition organization committee regulations.

7 Winners one-year break

Winners of 1st place cannot compete in the same category next year– they must take a one-year break from that category. At least 50% of the team must consist of non-winners. If the winners' team has three members, next year they should have at least one new member who was not previously on this team to compete in the same category again instead of taking a year off from it. *This rule is aimed at bringing new people, giving everyone a fair chance and encouraging recurring winners to try new competitions they usually do not participate in and to educate and engage new beginners in the field of robotics.* *****

*** The rule complies only with Robotex International standards and is used for Robotex International competition.**

8 Revision History

- 26.08.2026 Rules are created.

