REGULATIONS:

BOWLING Competition

Author: Robotex Cyprus Organizing Committee
Last Edition: March 2025

Table of Contents

1. Introduction

This competition simulates in a simple way a small-scale bowling game on a smaller field, with 10 pins like the regular game but of smaller in size and in two rounds of three frames instead of one round of ten frames. A simpler scoring procedure is applied which takes into account the strikes and spares a player can achieve, as in the normal game.

In the text the standard terms used in the bowling game are used.

2. Objective

The task for robots is to roll the ball on the field from one side of the field and knock down as many pins are possible that that are located at the other edge of the field.

3. The Team - Eligibility for Participation

1. The competition accepts participation of teams and not individuals.
2. The team consists of two (2) – five (5) persons.
3. **Only one player** of category X is eligible to participate in a team of the immediate higher category. That is:
   - A player of category «4th – 6th Grade Primary» is allowed to participate in a team of category «Gymnasium»
   - A player of category «Gymnasium» is allowed to participate in a team of category «Lyceum»
   - A player of category «Lyceum» is allowed to participate in a team of category «Adults».
4. The opposite of the rule 3.3 above does not apply. That is, one player of category X is not allowed to participate in a team of any lower category. For example, a player that belongs in category «Lyceum» is not allowed to participate in a team of category «Gymnasium» or «Primary 4^{th} – 6^{th}»; a player in the «Adults» category is not allowed to participate in the category «Lyceum» or «Gymnasium».
5. The coach of the team is not allowed to participate in the same competition with his/her team.
6. The team defines one of its members as a leader who will be responsible for the communication with the Organizing Committee, the judges and for the technical control process.

4. Robotic Platforms, Categories & Levels

1. The competition is organized for the robot platforms, in the categories and levels shown in the table below:

Table 1: Robotic Platforms, Categories & Levels for BOWLING Competitions

Challenges	Robotic Platforms	PRIMARY 4th – 6th	GYMNASIUM	LYCEUM	ADULTS
BOWLING	ARDUINO, KYPRUINO, MAKEBLOCK, MICRO:BIT RASPBERRY Pi, ARM, ESP, SELF-DEVELOPED ROBOT	√	√	√	√
LEGO BOWLING	LEGO EV3, LEGO SPIKE PRIME LEGO MINDSTORMS NXT	√	√	√	√

5. The Robot

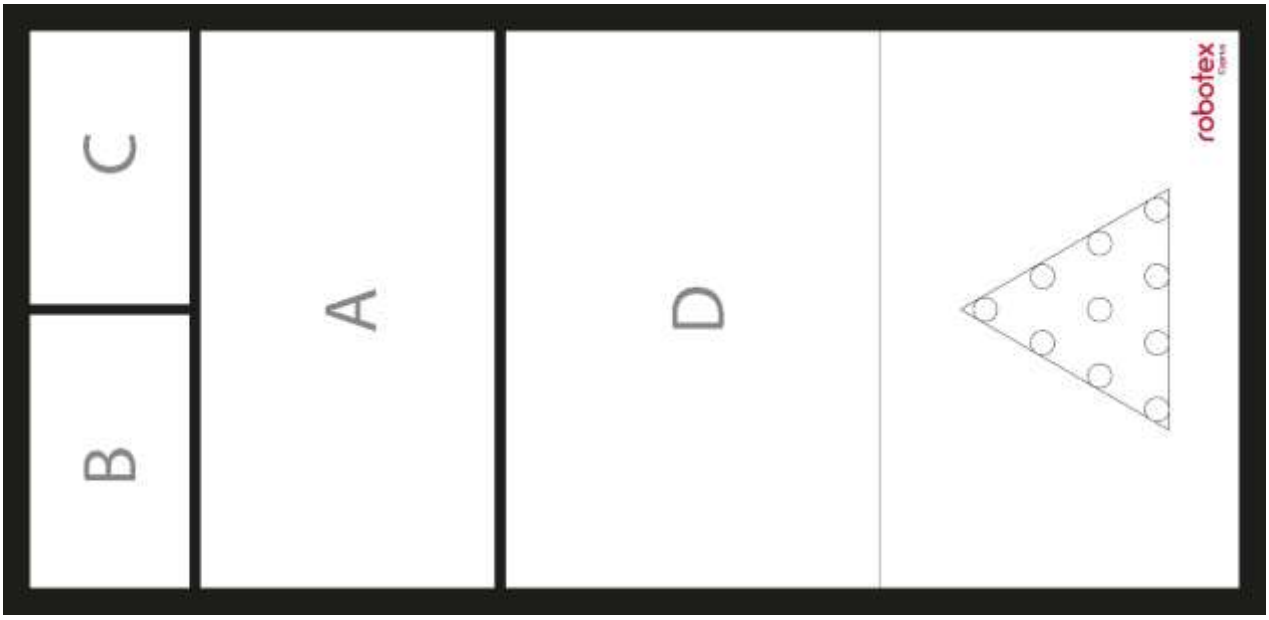
1. The robot must be autonomous.
2. Robot Dimensions: The maximum dimensions of the robot before the start can not exceed 25 cm length x 25 cm width x 50 cm height. The robot components are allowed to stretch/extend, but the maximum size of the robot after stretching/extend should not exceed 30 cm x 30 cm x 50cm height.
3. The maximum mass of the robot is 1 Kg.
4. For confirmation of the specifications indicated above the robot will be weighted and must fit easily in a control box.
5. The control box has dimensions 25 cm length x 25 cm width plus two (2) millimetres of tolerance.
6. *The two (2) millimetres tolerance refers to the control box only and not to the size of the robot which is specified in the clause 5.2 above. Tolerance is given so that the robot can easily fit in the control box*.
7. The robot must be placed in the control box without exerting pressure on it.
8. The robot must not damage the field or endanger the spectators in any way.
9. The robot must have a start and stop button.
10. Additional requirements for LEGO robot:
    - The robot must be exclusively constructed with authentic and licensed parts of LEGO and TECHNIC.
    - The robot must use only batteries or cells that are recommended by LEGO, preferably rechargeable.

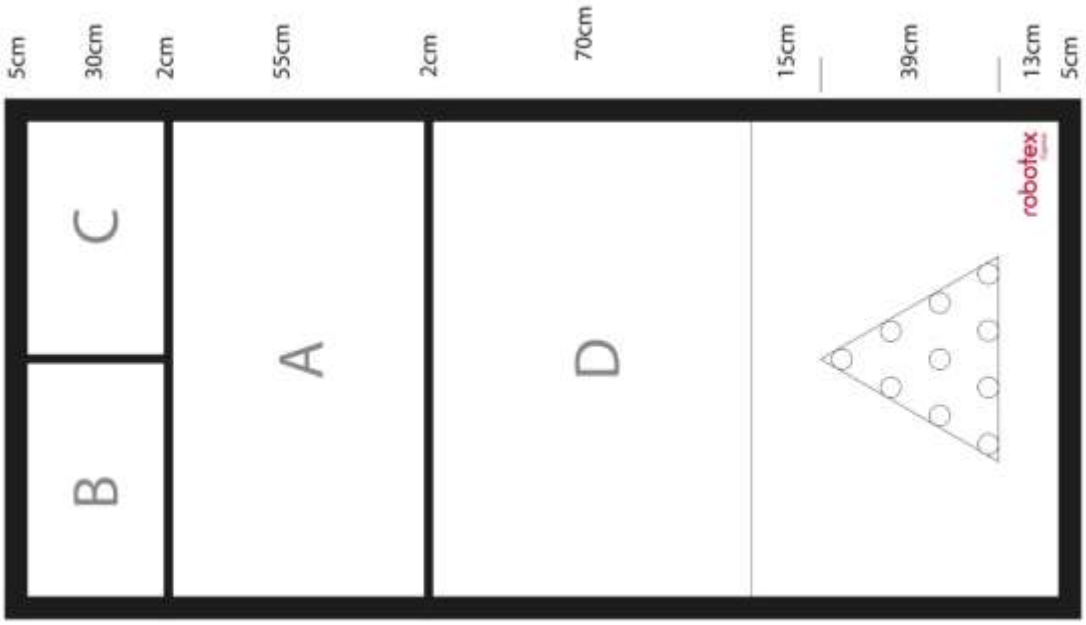
6. The Field

1. The definitions below explain the different parts of the track as shown in the two images below. In the text the terms Area A, Area B, Area C and Area D will be used with the meanings given below.

   - **Area B & Area C**: are the areas from which the robot can start. The area will be drawn before the start of the competition. This is the area the robot must also return to after completing each attempt. These areas are referred to as «starting area».
   - **Area A**: is the area that the robot must enter to throw the ball to hit the pins.
   - **Area D**: This is the area between Area C and the pins area. This is the area where the ball must roll, even for a few centimeters, before it continues rolling to hit the pins.

2. The size of the field is 236 long x 114 width and is surrounded by a perimeter barrier of 5 cm height.
3. The field is shown in the images below.
4. The color of the track is white with the texture of the printable tarpaulin.
5. The Area A indicated on the field is the area from which the robot rolls the ball and its length is 55 cm.
6. The possible robot starting areas, indicated by AREA B and AREA C on the field, have length 30 cm. The width of Area B is equal to the width of AREA C.
7. The starting area of the robot may be either Area A or Area C and is announced before the start of the game.
8. As shown in the figure of the field the width of three black lines that create Areas A, B and C is 2 cm.
9. 10 pins are placed on the field so that they form a triangular shape, the base of which is approximately 13 cm - 15 cm from the end of the field.
10. The thin black line, located approximately 70 cm after the end of area A and approximately 15 cm before the 1st pin, defines the point beyond which the ball must necessarily roll on the field in order for the ball to be considered a valid throw. It is understood that the ball may roll on the track at any point before the thin black line mentioned above.





[Download the field for printing and practice of the team]

7. The Ball and the Pins

1. The ball to be thrown by the robot is a standard tennis ball with a diameter from 6.54 cm to 6.86 cm and a mass from 56.0 g to 59.4 g. The ball will be provided for the throwing by the organizers.
2. The 10 pins are made of plastic and have a height of 19 cm. For the competition, a quantity of water of about 20 ml will be added inside the pins so that the final total mass for each pin is between 45 gr and 55 gr. The pins are monochrome, of various colours (blue, green, orange and yellow).
3. The pins will be placed on the field in a random way.
4. The pins shall be placed in an arrangement as shown in the images shown above in section 6. The Field, i.e. one pin on the 1st line, 2 pins on the 2nd line, 3 pins on the 3rd line and 4 pins on the 4th line.
5. There is a distance of 5 cm - 8 cm among the pins and the length of the sides they form is approximately 40cm – 50 cm.

8. The Bowling Game

8.1. Duration of the Game

1. The game will be played in 2 rounds, each round will have 3 frames. In each frame the player will have two attempts to roll the ball to knock down the pins.
2. The maximum available time for the completion of a frame is 3 minutes.
3. The frame must be completed within the available time given.

8.2. Start of the Game

1. There is one hour of testing the robots on the field. Before the testing, the starting will be announced.
2. The order in which the teams will play in the first round will be determined by draw. In the second round, the reverse order will be followed.
3. In order to give all players of the team the opportunity to participate in the competition, it is suggested by the Organizers that the rolls in each frame are taken by a different player.
4. Before the referee blows the whistle, the player can place the robot within the starting area drawn earlier, while ensuring the vertical projection of the robot to fall within the starting area.

NOTE: The points 5-9 below apply for each attempt of all frames.

5. After the referee blows the whistle, the player can load the ball on the robot. Then the robot must start autonomously, five seconds after the player presses the start button (time delay).
6. After the robot starts, it should continue to enter Area A to roll the ball.
7. If the robot can't enter Area A it is not allowed to roll the ball and the attempt (NOT the frame) is considered void.
8. If during the attempt any part of the robot touches or exceeds the black line that separates Area A from Area D, then the throw/attempt is regarded void and no points are given. This also applies for the vertical projection of the robot.
9. When the robot completes the attempt, it must automatically return at the starting area and repeat steps 5-9 if the player so wishes (see point 10 below).

   If the robot can't return at the starting area or the player touches the robot before any part of the robot touches the black line of the starting area, the attempt/throw (and not the frame) is considered void and no points are given for the attempt.
10. The player is allowed to give up the second attempt of the frame. In this case again the robot must return at the starting area. The second paragraph of point 9 above also applies in this case.

11. During the return of the robot at the starting area, the player can take the robot when any part of the robot touches on any part of the black line of the starting area
12. The ball must roll on the field from anywhere in Area D in order to hit the pins. If this is not the case then the attempt is considered void and no point are given.
13. If the ball directly hits the pin, without the ball rolling anywhere in Area D, the throw/attempt is considered void and no points are given
14. If the ball hits any anywhere on the walls/barriers of the field, the throw/attempt is considered void and no points are given.
15. If the robot does not start on the first attempt of each frame, the player can attempt to restart it only once. If the robot does not start again then the attempt is considered void and no points are given. It is noted that restarting the robot only applies for the first attempt of each frame and not the second.

9. Scoring

1. Scoring is the same as in the regular ten-pin bowling, except only 5 frames will be played in each of the two rounds.
2. In each frame, the robot has two attempts to roll the ball and knock down as many pins as possible.
3. One point is awarded for each pin knocked down.
4. If all ten pins are knocked down with the first throw, a strike is awarded and no second throw is made in that frame. The score is 10 points plus the points from the next two throws as a bonus.
5. If all ten pins are knocked down with two throws, a spare is awarded. The score is 10 points plus the points from the next throw as a bonus.
6. If all 10 pins fall in the last third frame, one more throw is allowed for additional points. The score received is 10 points plus the points from the extra throw.
7. The team's points in each frame are recorded, at the end of each round the points of the team in all frames are summed up.
8. At the end of the competition, the two scores of the team in the two rounds are recorded.

10. Declaring the Winning Team

For each age group separately:

1. A ranking is made based on the total points achieved by the teams in the category.
2. The team with the highest total points in any of the rounds takes the first place, the team with the next highest points takes second place, etc.
3. In case of a tie, the second-best total points are considered. If a tie still occurs, the teams compete in an additional game of one frame to decide the winning team in the category. In this process, ten (10) minutes are given to the team to improve their robots.

Applying the practice followed at Robotex Cyprus, a final round (best-of-the-best) of one frame will be held between the teams with the highest score in each category. For this final round, the teams make only one frame and a ranking is made to highlight the winning team

11. Terms and Conditions of Participation

1. Participation in ROBOTEX CYPRUS assumes and requires acceptance of all terms and conditions for participation by competitors, the coaches and the organizations they represent.
2. In case of any difference in the competition rules between the English and the Greek versions, the English version is considered as correct.
3. 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 in which it will compete which is generated by an algorithm in the information system supporting the ROBOTEX CYPRUS organization.
4. In this challenge, there are two (2) judges. An additional head judge may also be present to supervise the whole process.
5. All questions and issues that may arise during the competitions must be reported to the judges.
6. The final decision about objections will be taken by the judges in cooperation with the organizers.
7. Judges' decisions on any objections are considered final and can't be challenged by participants, the coaches or the organizations they represent.
8. In the case of a deliberate alteration or change of marking of the unique number of robots, the coach and his team will be automatically expelled from the event. As a result, they will not be able to take part in any other challenge they may have enrolled. The coach and his team will leave the venue immediately. The coach also loses the right to take part in the next ROBOTEX CYPRUS event and is automatically excluded from participating in ROBOTEX INTERNATIONAL in case one of his/her teams has won a ROBOTEX CYPRUS competition. The Organizing Committee reserves the right to publicly announce the coach, the team and its members.
9. It is expected that both the coaches and the members of the teams will exhibit a spirit of noble rivalry and will behave with mutual respect, decency and esteem both to themselves and to the organizers, judges and volunteers. The behaviour of all coaches and team members should promote "fair play". Therefore, the Organizing Committee reserves the right to expel anyone from the venue of the event who violates the above principles of good practice.

12. Robot Technical Control

1. An initial technical control of the robot technical control will take place on the day of the competition at an area and on time specified by the organizers.
2. Technical control takes place before each phase of the competition (preliminary, qualifying, final) in which the team may participate.
3. Failure of a team to come in time for a robot's technical check leads to the team being excluded from the event.
4. The leader of the team only is responsible to take the team's robot for technical control.
5. Technical control includes the control of the robot based on the above and the section «**6. The Robot**». If the robot does not meet the requirements, it will not be accepted to compete and will automatically be disqualified from the event.

13. Changes and Cancellation of Rules

1. Any changes and/or cancellations in the rules of the competition are decided by the Cyprus Computer Society in consultation with the Organizing Committee of ROBOTEX CYPRUS. You may address comments and suggestions to the Organizers at **robotex@ccs.org.cy**.