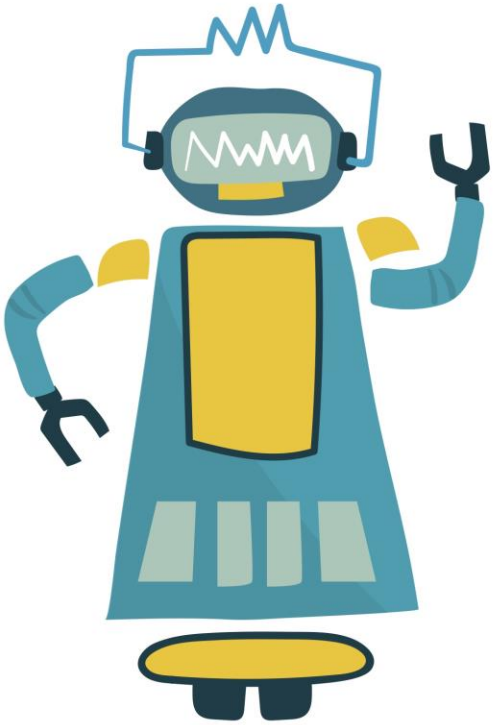
RoBo Junior



APRIL
17
AVRIL
2020

ÉCOLE SECONDAIRE
ROSEMOUNT
HIGH SCHOOL

3737 Beaubien E, Mtl,
QC, H1X 1H2

UN PROGRAMME DE
A PROGRAM OF

AEST
EAST

ALLIANCE POUR L'ENSEIGNEMENT DE LA SCIENCE ET DE LA TECHNOLOGIE
EDUCATIONAL ALLIANCE FOR SCIENCE AND TECHNOLOGY

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Hi everybody,

Welcome to the 18th edition of Robo-Junior. This competition is produced by AEST, the Alliance for Science and Technology Education, a non-profit organization whose mission is to encourage, inspire and improve the learning of young people in the field of science and technology.

This year we are trying a new competition format. The one-day event will take place on April 17th, 2020 at Rosemount High School. This document includes all the rules you'll need to prepare yourself for competition.

The main game is a triathlon. It includes 3 challenges to be accomplished: strawberry picking, lawn distance and stair climber. The lawn distance is different for primary and secondary student. There is also a bonus game which will be revealed at the competition, but which is not included in the overall award. There will be an award to highlight the best team among those who want to participate. We will also judge your creativity by asking each team to decorate their table.

We want to accommodate as many teachers as possible. The competition schedule will be flexible to allow participants to arrive and depart without haste. From 8 a.m., the main competition begins. The judges will assess the teams until 12:30 p.m. Around 1:30 p.m., we will do an award ceremony.

Looking forward to meeting you at the competition,

Fanny Beauchemin
Coordonnatrice de Robo-Junior
fanny.beauchemin@sciencetech.ca

Triathlon

The main goal is to construct a robot to perform tasks that challenge skills with sensors and motors. The challenges are designed to test these skills either individually or in harmony with other sensors. Unless otherwise stated in the specific game, the general global rules include the following limits:

This year, teams will get a bonus card, on which they can write the name of the event that they determine will be their most successful. This will add points to their overall score if they guess correctly. This will allow teams to reflect on their design and programming before the competition starts.

a. The maximum power supply voltage is: 10 volts.
b. The maximum weight for a robot is 2 kg.
c. The robot size must not exceed 32 cm in height and must fit in a cylinder with a diameter of 32 cm (with parts fully extended)
d. There is no limit to the number of wheels.
e. The results each division (elementary and secondary) and each event will be compiled, the team with the highest overall standing will win the triathlon.
f. All tasks can be done one after the other in any order desired. The team can take a time out between each task.
g. You can use the same robot, a modify version or a completely different one for each task.
h. It is important that the spirit of these rules be followed. If there are any questions regarding the changes to the event, please do not hesitate to contact with the coordinator, Fanny Beauchemin (fanny.beauchemin@sciencetech.ca). If during the competition, a judge has a doubt that the spirit of the competition is not being respected, the judge reserves the right to disqualify the team.

Points

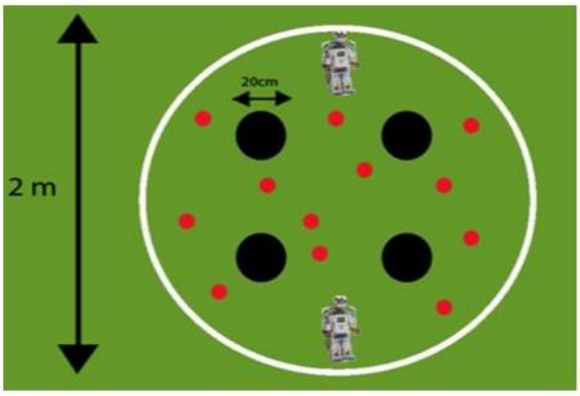
The winner of the triathlon will be the team with the best overall performance throughout all 3 events. Points will be awarded according to the following scheme. The winner will be the team with the most overall points. In the event of a tie, the team with the fastest time will be the winner.

1st place	15
2nd place	12
3rd place	9
4th place	7
5th place	6
6th place	5
7th place	4
8th place	3
9th place	2
10th place	1

Strawberry Fields

Task

Construct and program a robot that can “pick” strawberries and bring them off the field faster than an opponent. It must be able to do this while avoiding any obstacles on the field. As well, your robot is not to pass the white perimeter of the field.



The challenge:

Tests programming skills, focusing on the robot’s speed, using sensors and their ability to recognize color.

1. The field itself will be green (Astroturf) and approximately 2 meters in diameter. The border of the field will be marked by a 2cm white line.
2. Both teams start at opposite sides of the field.
3. The Strawberries will be wooden pucks of 3cm in diameter and 2cm high, painted red. They will be randomly placed on the field, an equal number of strawberries will be placed on each side of the field.
4. Your robot has 2 minutes to pick as many strawberries as possible and push them off the field. The judge will grant 1 point for each strawberry pushed out of the perimeter. Just to be clear: the robot does not have to pick the strawberries off the ground; they can simply push them off the field.
5. The final score for a team in this competition will be the total of all strawberries picked over all games.
6. The winner will be the team who collects the most strawberries in 2 minutes. If parts become dislodged during the match, the game time will be paused and the referee will remove that part from the ring. If that particular part is essential for the robots mobility, or sensory input, the team will have 10 seconds to put it back on.

No changes from the original design will be allowed. Absolutely no programming changes will be tolerated.

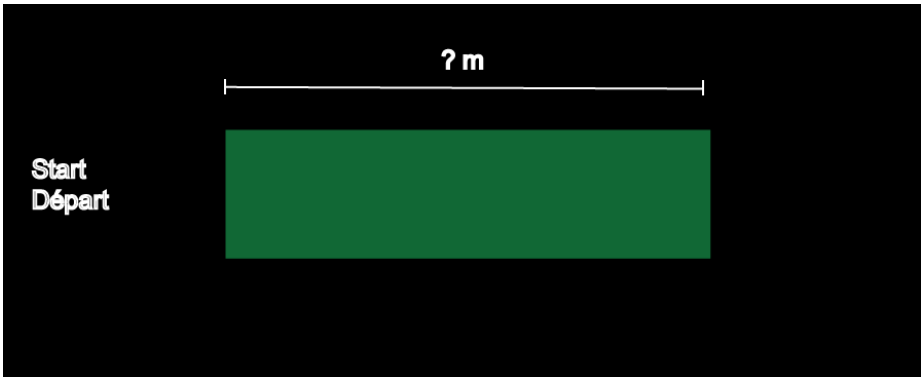
7. The robot must stay inside the white circle. If the entire robot passes the white line, the robot will be taken off the field and given a 10 second penalty. Once this time is up, the robot will be placed back onto the playing field at the starting position.
8. If the entire robot passes the white line, any strawberries it was pushing will not count for points.
9. If the robot stops moving on the playing field for 10 seconds, the robot will be taken off the field and given a 10 second penalty. Once this time is up, the robot will be placed back onto the playing field at the starting position.
10. The top two teams with the most points will move onto the finals. The team with the most strawberries after this final match will be declared the winner.
11. Winners from Round 1 will move on to the next round. This particular group of Robots will be called Stream A. Those who lost in the first Round will compete against each other in Round 2 of Stream B.
12. In between matches, modifications of the build and programming of the robots are allowed.
13. The eventual winners from Stream A and Stream B will compete against each other for first place overall.

Lawn Distance – Elementary schools only

Task

You will be placed on a black surface. In front of your robot will be a patch of green cardboard. Your task is to measure the length of the green patch in centimeters. The robot that measures the length most accurately wins, in the event of a tie, the fastest robot wins.

The challenge: tests programming skills, data manipulation, using light sensors and their ability to recognize the color and making precise measurements.



Rules and Specifications

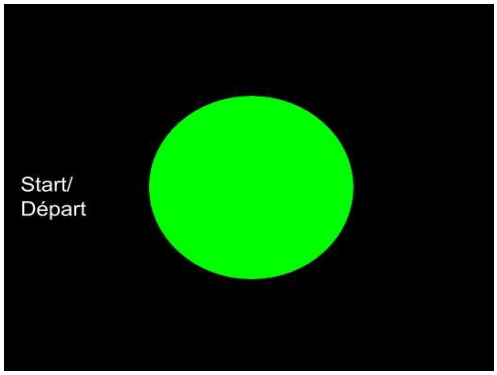
1. The field will be black with a green cardboard rectangle affixed. The maximum length of the rectangle is 2m
2. At the beginning of the round, the judge will place your robot at an unknown distance in front of (and facing) a green rectangle.
3. Robots must have a button **(not the buttons on the EV3/nxt brick)** that will allow the robot to start moving.
4. When the trial begins, your robot must advance to the green rectangle, and begin measuring.
5. When your robot reaches the end of the rectangle, it must clearly display the length of the rectangle in centimeters on the EV3/NXT ‘s display panel.
6. The accuracy of your measurement will be important, your measurement may include decimal places.
7. There will be 3 rounds, each will have a rectangle of a different length.
8. The winner of the competition will be the robot that most accurately measures a rectangle (percent error will be used). In the case of a tie, the robot that takes the measurements with the most speed wins.
9. The maximum time allowed is 2 minutes, if your robot does not complete the measurement in that time, you will forfeit the round.

Lawn Area – Secondary schools only

Task

You will be placed on a black surface. In front of your robot will be a patch of green cardboard. Your task is to measure the area of the surface covered by the green patch in square meters. The robot that measures the area most accurately wins, in the event of a tie, the fastest robot wins.

The challenge: tests programming skills, data manipulation, using light sensors and their ability to recognize the color and making precise measurements.



Rules and Specifications

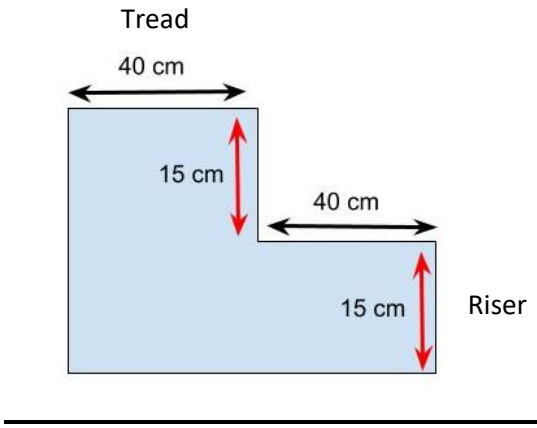
1. The field will be black with a green cardboard circle affixed. The circle will have a maximum diameter of 1m. The black field will have a maximum length of 2m.
2. At the beginning of the round, the judge will place your robot on the perimeter of the black field.
3. Robots must have a button **(not the buttons on the EV3/NXT brick)** that will allow the robot to start moving.
4. When the trial begins, your robot must begin its measurements.
5. When your robot completes its measurements, it must clearly display the area covered by the green circle in square centimeters on the EV3/NXT's display panel.
6. Students are to use $\pi = 3.14$
7. The accuracy of your measurement will be important, your measurement may include decimal places.
8. There will be 3 rounds and each will have a circle of a different size.
9. The winner of the competition will be the robot that most accurately measures the area of the circle (percent error will be used). In the case of a tie, the robot that takes the measurements with the most speed wins.
10. The maximum time allowed is 5 minutes, if your robot does not complete the measurement in that time, you will forfeit the round.

Stair climber

Task

Climb two stairs with closed risers as fast as possible.

The challenge: test design, understanding of frictional force, balance and power.



Rules and Specifications

1. Each stair will have a closed riser of 15 cm and a tread of 40 cm. There will be two closed risers and two treads.
2. Robots will begin the stair climb at the base of the first riser. The second tread is where the robot must stop.
3. Robots must have a button **(not the buttons on the EV3/nxt brick)** that will allow the robot to start moving.
4. Your robot must climb the stairs in the shortest time possible and the trial will end when all parts of the robot are on the 2nd tread.
5. The robot may only be in contact with the stair or the floor to perform the climb.
6. The robot will have a maximum of 5 minutes to climb the stairs.
7. The winner will be the robot that climbs the fastest.
8. There will be three attempts. The fastest attempt will be the time recorded for this event.

Creativity

Each team will have to decorate their table. The size of the table will be confirmed soon. For instance, the team can use a poster with information about their robot, a tablecloth, organizational items, etc. Each team must identify their table with the name of their team and their school.

Points

- Clear identification (name of school and team) 15%
- Creative and original 35%
- Informative and clear 25%
- Organized and practical 25%

The points of this category will be included in the overall ranking.

Bonus Maze

This game will be revealed at the competition. The objective of this game is to challenge our best team. Your participation is optional.

Points

This game will not count in the general classification. The team with the most points will receive a prize. Scoring will work the same as the main game.

Awards

a. Each participating school will receive a participation award.
b. The team with the highest score for each task will receive an award.
c. The team with the more creative table will receive an award.
d. The team with the best overall ranking will receive an award.
e. The team with the highest score at the Bonus Maze will receive an award (not included in the overall ranking).
f. Each participant will receive a medal.