



Su *moose*

Robot ZONE [01]

• Duel challenge 2027 •

Context

Merodian is home to hundreds of moose, being a village located up north, surrounded by forest. One particular piece of land is desired by all female moose to raise their babies. Therefore, their male partners must fight, using all their strength in their antlers to defeat their opponent and claim the territory. The ground is uneven in the forest, filled with roots, rocks and holes created by marmots and other rodent and makes it difficult for a 500 kg animal to stand on their long thin legs while battling. Who will win this confrontation?



Surface Used: Z01-SUMO Mat

The surface is a black circular playing area, 90 cm in diameter, bordered by a white strip 5 cm wide. In the center of the arena, 2 parallel grey lines are placed 10 cm apart.

The mat is available at [Zone01 shop](#).

Robot Description

Robots must comply with the following constraints:

- Maximum starting dimensions: **25 cm X 25 cm X 25 cm**
- Maximum weight: **850 g**
- Max motors: **3**
- Max controller: **1 (EV3 or Spike Prime)**

The robots must be built so that they are able to overcome an uneven terrain. Robots shall avoid getting stuck on the playing field because of pieces colliding with the game element.

Robots must be equipped with at least one light/color sensor to detect the white line around the playing field.



Robots must operate autonomously without remote control.

The following robot actions are NOT allowed:

1. Attempt to break the opponent
2. Throwing projectiles
3. Use of adhesive or other chemicals to increase grip

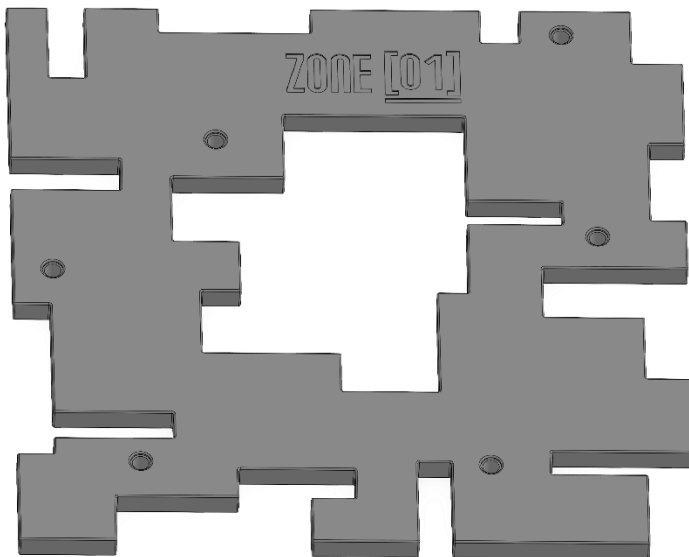
The following elements of a robot ARE allowed:

1. Defensive elements such as bumpers, inclined planes, etc.
2. Rubber bands for anything other than friction between wheels and ground
3. Offensive elements designed to knock down or flip the opponent
4. Wheels and caterpillars

Game Element

Uneven ground

Two large black pieces of uneven ground representing roots, rocks and holes will be placed on the board as an obstacle and attached using double-sided tape. Exact position and orientation will be decided randomly the day of the competition and remain the same for the whole day.



Element Description

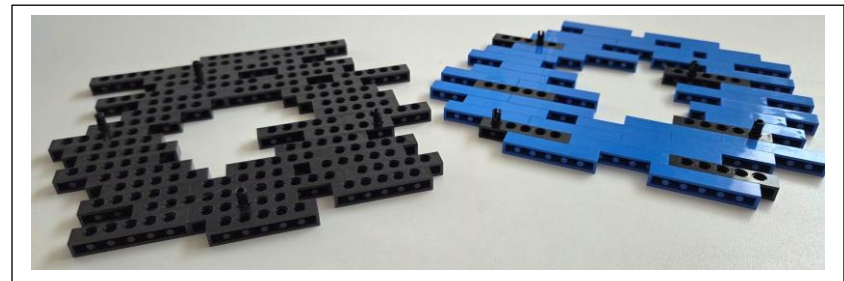
Each piece of uneven ground will fit within a 20 cm x 20 cm square area, but it will have an obscure shape. The height is 8mm.

At the competition, Zone01 will install 2 black 3D printed pieces of uneven ground on the playing field.

To practice, LEGO versions can be made with standard LEGO bricks 1x2, 1x4 or 1x6. Zone01 does not provide a building plan. Team can build their own version of it.

Each piece of uneven ground will include a large hole in the middle and four Technic pins placed randomly on the available holes.

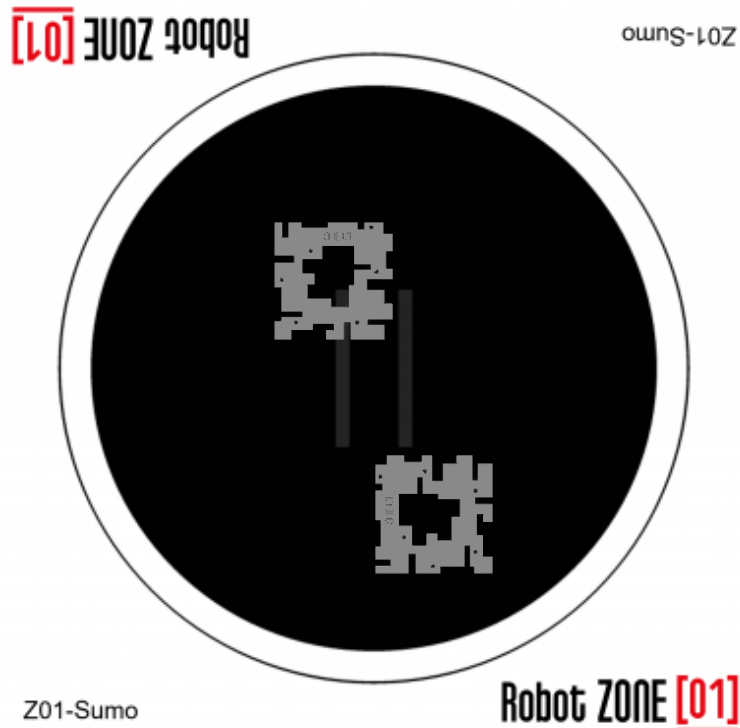
The pins are an additional 8mm tall, totalling 16mm.



Starting Position

At the beginning of the round, each team's robots must be side-by-side, the left side of the robot close to the grey line. It should be easy to identify the front of your robot, so add a distinctive sign.

An example of the 2 pieces of uneven ground positioning is shown below.



Pool System

Teams will be separated into pools, each corresponding to a table.

Each team will meet each of the other teams in its pool for a single match and accumulate points.

After all pool matches have been completed, an average of points per match will be calculated for each team and a ranking will be created.

The finalists will be determined from the ranking and placed in a bracket. Within the bracket, teams will compete in best of 3.

It is allowed to use a different program for each match, but the team cannot modify and download a new program during the round unless requested by the judge in case of false start.



Match Description

Robot inspection

Before the start of the round, the robots will be inspected by the judges. Robots are weighed, measured, and inspected to ensure that they comply with the regulations.

Start of the Round

1. Only two members of each team may approach the circle.
2. Both teams then position their robot in their starting area and select the program they want to use.
3. At the signal given by the judge, each team activates the program of its robot (see general rules for LEGO Spike Prime start-up procedure).
4. The robots must wait **5 seconds** before moving to give the students time to back up.
5. Each robot must then move **backward** until it reaches the white border of the playing field before starting to fight its opponent.

False start

The judge may request, for any reason he considers valid, a new start. A false start is normally defined as:

1. Failure to respect the 5-second delay from the start;
2. Starting the program before the judge's signal;
3. Failure to back up to the white border.

Victory

A victory is defined by:

1. The opponent's robot leaves the arena. The robot is considered to have left the arena in these situations:
 - a. When **its driving wheels** are outside the black zone;
 - b. If using gears to make a 4-wheel drive robot; when the two wheels closer to the motors are outside the black zone;
 - c. If using caterpillars, when half of each caterpillar is outside the black zone.
2. The opponent is flipped over and out of action.
3. The opponent makes two "false starts" in a row.
4. A student from the opposing team touches a robot.

Draw

A draw is defined by:

1. The robots seem to have come out at the same time, and it is not possible to know which one left the black zone first.
2. The robots are entangled or rotate around each other for more than 10 seconds without any noticeable change.
3. The two robots stop moving.

When situations 2 and 3 occur, the judge starts counting loud from 1 to 10. If, the situation remains after 10 seconds, it is considered a draw. Else, the match resumes and the fight continues.



Points per Match

	Points max
3 points for a win - Take out your opponent	3
<i>1 point for a draw</i>	<i>1</i>
MAX TOTAL	3

Necessary for This Challenge

- Color sensor and loop
- Concept of friction and mass
- Defense and attack mechanisms
- Strategy to deal with uneven ground
- Distance or touch sensors (optional)

Strategy Suggestions

- How important are mass and friction in this challenge?
- Do you have multiple programs or tactics?
- How can you use the uneven ground to your advantage?