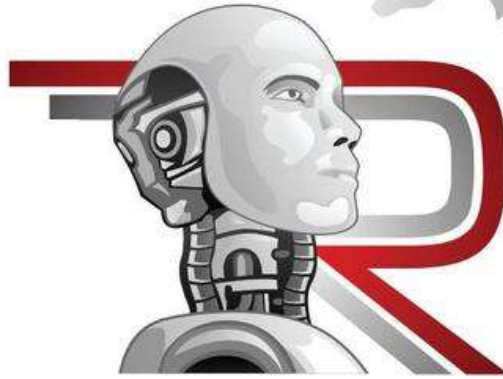


RoboRAVE
Australia



AlpineBot

Revision 3 - Updated 17/04/2024.

2024 Official Game Manual
RoboRAVE Australia

Our motto: *"Today's Play, Tomorrow's Pay."*



Revision History		
Revision	Date	Description/Changes
1	27/01/2024	2024 Challenges Released
2	04/03/2024	Graphics updated. All field dimensions confirmed.
3	17/04/2024	Team limit increased to 5. Wording changes to rule 1.3:5a. Added safety requirements for rule 1.3:5b.

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1.0 Overview

1.1 What is AlpineBot?

Welcome to AlpineBot, RoboRAVE's zenith of engineering and robotics challenges, designed to push the boundaries of autonomous robotic capabilities. This competition invites teams to engineer robots capable of scaling a steep incline, aiming to plant a flag at the summit. It's a test of endurance, strategy, and precise control, embodying the spirit of adventure and technological innovation.

The AlpineBot challenge poses unique difficulties, navigating slopes reaching up to 80° in incline! Robots must be robust, adaptable, and finely tuned to handle the incline's gradient. Precision in programming and mechanical design is paramount, as competitors face the task of not just reaching the summit but also performing the intricate action of flag placement on a Bullseye— all under the pressure of time.

For participants seeking a more programming-oriented challenge should consider Mouse Labyrinth instead. It provides a complex that require a lesser focus on mechanical concepts, focusing on maze navigation and autonomous decision-making.

1.2 Who can compete in a team?

AlpineBot is offered to students in the following divisions:

- 1) Middle School (MS) – Ages 11-13
- 2) High School (HS) – Ages 14-18
- 3) University/Professional (UP) – Ages 19+

The division a team enters is dependent on the oldest team member in that team at the time of registration. Teams can choose to enter a higher age division but cannot enter a lower one.

Teams should consist of 1-5 competitors. Teams with more than 5 members will not be allowed to compete in the competition or will be forced to register additional team(s) to compete.

1.3 What are the requirements for the robot?

Robots must fit all of the following criteria to eligible to compete:

- 1) The total cost of the robot does not exceed \$1,500 USD.
- 2) Robots can be made from any platform and material.
- 3) Multiple sensors, motors, and processing units can be used.
- 4) The robot is completely autonomous and does not use of any remote-control features.
 - a. Devices such as remotes or tethers cannot be used to control the robot.
 - b. Programs can be run from an external device (e.g., laptop) at Home as long the device isn't operated while the robot is not at Home.
- 5) The robot is permitted to use propellers, grappling hooks, or other projectiles.
 - a. The robot must remain supported by the ground or field at all times. Robots cannot fly or hover.
 - b. Dangerous elements, such as propellers or projectiles, must have adequate safety considerations, such as cages, barriers, or tethers. Robots with excessively dangerous components with no safety precautions will be disqualified.
- 6) The robot must be a suitable size to complete the challenge as deemed by the competitors.

2.0 Operating the Game

2.1 How does an official game run?

Intended to describe how a game might look to someone who has not played the challenge.

Climbing the Ramp:

- 1) Robots will begin at their designated starting positions on the ramp (ES), in front of the ramp (MS), or 30cm behind the ramp (UP).
- 2) When the timers start, robots must begin autonomously climbing the ramp, receiving points the higher up they climb.
- 3) If the robot is unsuccessful, it can attempt another run. However, the timer will continue until the game finishes.

Placing the Flag:

- 1) Once robots have climbed to the top platform, they must place the flag onto the Bullseye. The closer to the centre the more points they earn.
- 2) Teams in the UP division will gain additional points for keeping the flag upright and not touching it.
- 3) Teams receive points for how much time is left on the stopwatch if they successfully placed the flag.

2.2 What are the rules in an official game?

The following rules are enforced during official competition games by the referee:

- 1) The referee will ensure the team and robot are compliant with the rules in 1.2 and 1.3. If the referee believes any of the eligibility criteria are not met, the Head Referee will be brought in to determine further actions.
 - a. A team or robot that does not meet the eligibility criteria will usually not be allowed to compete and be required to make changes based on the Head Referee's decision.
- 2) The game lasts for up to two minutes timed by the referee and is the only time-period the robot can score points. It is played on a predetermined field that complies with the rules in 3.0.
- 3) The robot's start position at the start of the game or any time when they re-attempt the climb is dependent on the team's division:
 - a. (MS) Robots start angled on the ramp with the back of the robot against the floor.
 - b. (HS) Robots start flat on the floor with the front of the robot against the ramp.
 - c. (UP) Robots start placed anywhere behind the 30cm start line.
- 4) The score for the game is the best run the robot achieved during the game.
- 5) There are several reasons a robot may be returned to the Home.
 - a. If a competitor touches the robot or the field outside of Home or the Start Unit.
 - i. Referees can choose to end the match if the field interference has a significant benefit to the robot's performance.
 - b. With the referee's permission, competitors can return the robot Home for any reason.
 - c. Upon being returned Home, the Flag must be returned back with the robot.
- 6) Only competitors can operate and manipulate the robot during the game. Remember, "Players Play, Coaches Coach, Parents Cheer".

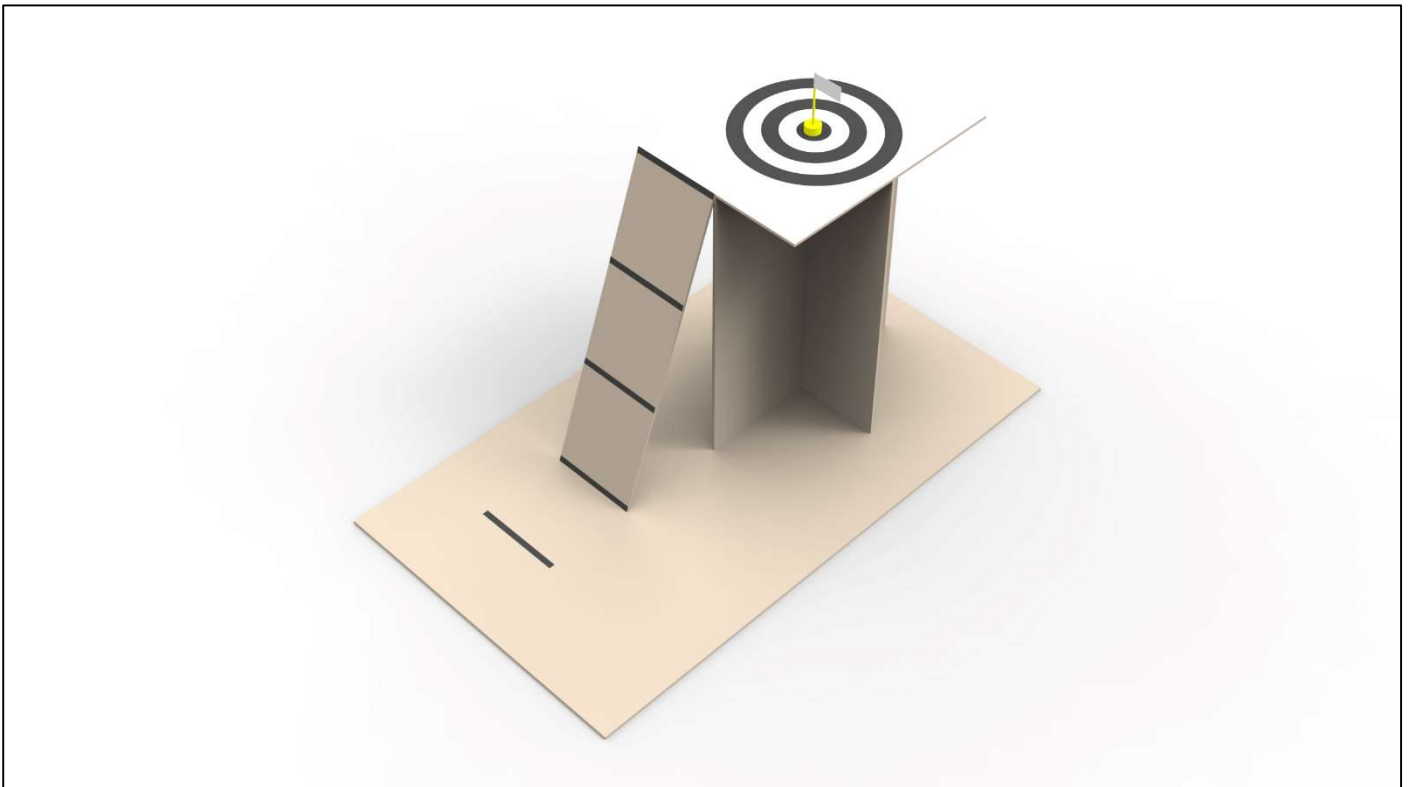
3.0 Competition Field

3.1 How is the field constructed?

All official AlpineBot fields will fit the following description:

- 1) A white top platform that measures 80cm long x 60cm wide x 2cm thick is raised 100cm off the ground by two 98cm long x 60cm wide x 2cm thick panels. Each panel has a 2cm thick cut in the middle that extends halfway down the length to allow the panels slotted together.
- 2) The ramp has 2 different variations depending on the divisions:
 - a. (MS/HS) The field consists of an 116cm long x 30cm wide x 1.2cm thick ramp at a 60° angle. The ramp has 60° cuts on either end to lay flush with the top platform and ground.
 - b. (UP) The field consists of an 102cm long x 30cm wide x 1.2cm thick ramp at an 80° angle. The ramp has 80° cuts on either end to lay flush with the top platform and ground.
- 3) The field consists of white painted particle board 2cm thick, with 2cm black electrical tape signifying lines at the start, one-third, two-thirds, and top points of the ramp. (UP) A start line is also marked 30cm from the base of the ramp.
- 4) The top platform has a 50cm diameter Bullseye, consisting of 5cm thick black and white lines, and a 10cm wide central circle. It is centred on the board and spaced 5cm from the long edge and 15cm from the short edge.
- 5) The flag is a PLA 3D printed piece that consists of a 5cm diameter x 2.5cm high cylindrical base, with a 20cm long x 0.5cm central pole. The top of the flag has an outcrop on one side of the pole 10cm long by 5cm wide. STL files to print are available on the RoboRAVE website.

Standard field design and example field (UP) for AlpineBot:



4.0 Points and Scoring

Challenge:	Maximum Points per Mission		
	MS	HS	UP
4.1.1 1/3 Climb	10p	10p	10p
4.1.2 2/3 Climb	15p	15p	15p
4.1.3 Summit	20p	20p	20p
4.2.1-5 Flag	5-30p	5-30p	5-30p
4.2.6 Standing Flag	20p	20p	20p
4.2.6 Time	1p per second	1p per second	1p per second
4.3.1 Base	N/A	5p	5p
Total Maximum Points	95 + time	100 + time	100 + time

4.1 What points can be earned climbing the ramp?

Points are only awarded the first time a specific task is completed in a game.

- 1) **1/3 Climb (10p)** – The robot completely passes the 1/3 black line, earning 5 points.
 - a. The entirety of the robot must completely pass the 1/3 black line.
 - b. No part of the robot can be behind, touching, or overhanging the 1/3 black line.
- 2) **2/3 Climb (15p)** – The robot completely passes the 2/3 black line, earning 10 points.
 - a. The entirety of the robot must completely pass the 2/3 black line.
 - b. No part of the robot can be behind, touching, or overhanging the 2/3 black line.
- 3) **Summit (20p)** – The robot reaches the top of the ramp earning 15 points.
 - a. The weight of the robot must be supported only by the top platform.

4.2 What points can be earned on the top platform?

Points are only awarded after completing the climb up the ramp and achieving the Summit points.

- 1) **Flag (5-30p)** - The flag is placed on one of the rings or the central Bullseye, with the nearest part of the flag base to the centre of the Bullseye marking its scoring area:
 - a. **Central Bullseye (30p)**
 - b. **Inner White Ring (20p)**
 - c. **Inner Black Ring (15p)**
 - d. **Outer White Ring (10p)**
 - e. **Outer Black Ring (5p)**
- 2) **Standing Flag (20p)** – The flag is placed standing vertically and no part of the robot is touching the flag earning 20 points.
 - a. The flag's base must be flat on the platform.
 - b. The robot cannot be touching or supporting the flag.
 - c. Standing Flag points only apply to robots who have achieved any points for the Flag.
- 3) **Time (1p/s)** – Every second left on the timer at the end of the game is worth 1 point. Time points only apply to robots who have achieved any points for the Flag.

4.3 What extra points can be earned in the HS/UP division?

Points are only awarded to teams in the HS or UP divisions.

1. **(HS/UP) Base (5p)** – The robot successfully climbs onto the ramp, earning 5 points.
 - a. The entire robot must be parallel with the ramp relative to its climbing surface.

5.0 Finals

5.1 How are the top teams selected?

The finals are used at the official competition to determine the top teams in a division. They put the best of the best live against each other to find the best team and robot. The teams for the AlpineBot Finals are determined as follows:

- 1) Teams will complete official timed games on the day. The number of games on the day is determined by the Event Director but will be a minimum of three.
 - a. An official game is any game operated by a referee with a recorded score.
- 2) The best game from the day for each team will be the only one considered for the finals.
- 3) The teams with the top 8 or 16 best games in each division will be brought forward to the finals.
 - a. If there is a draw between two teams then both teams will progress.
- 4) If the divisions were collapsed due to low team numbers, each division should run its finals as if they weren't collapsed.
 - a. Teams from different divisions should not compete against each other in the finals.
 - b. Depending on the size of the division, they may result in an automatic victory.

5.2 How do the finals work?

The finals for AlpineBot are operated under the following rules:

- 1) The top teams in each division compete against each other in an additional set of games. Each team will have one opportunity to do their best run to get into the Grand Final.
- 2) The score achieved in the finals determines the team's final ranking, excluding the top 3 teams, who instead progress to the Grand Final.
- 3) The top 3 teams will compete in one last set of matches to determine 1st, 2nd, and 3rd place, awarded in order of highest points scored in the Grand Final.
- 4) All three positions will receive awards for recognition of their achievements.