

Competition Rulebook

Swiss Rover Challenge - Edition 2026

1. Rover Specifications

1.1. Overview

Your rover needs to fit in a 1200x600x600mm cube.

It needs to drive on the ground with wheels or tracks.

It needs to be actuated by brushed DC motors of diameter 25mm such as in [EduBasics](#).

It needs to be powered by a single certified 18V Li-ion power tool battery & [power receiver](#).

It can be produced by any means, including but not limited to:

- 3D Printing
- Laser cutting
- Welding
- Machining

1.2. Control

Your rover needs to be controlled over standard wireless communication protocol such as:

- Wifi 2.4Ghz
- Wifi 5.0Ghz
- Bluetooth

Any antennae or emitters present on the platform should respect the specifications as described by **ETSI**, the *European Telecommunications Standards Institute* under the **RED Directive** (Radio Equipment Directive 2014/53/EU). Here is an overview :

Protocol	Frequency Band	Max Power (EIRP)	ETSI Standard
Wi-Fi (2.4GHz)	2400 - 2483.5 MHz	100 mW (20 dBm)	EN 300 328
Wi-Fi (5 GHz)	5150 - 5350 MHz	200 mW (23 dBm)	EN 301 893
Wi-Fi (5 GHz)	5470 - 5725 Mhz	1 W (30 dBm)	EN 301 893
Wi-Fi (5 GHz)	5725 - 5875 Mhz	25 mW (14 dBm)	EN 300 440/SRD
Bluetooth	2400 - 2483.5 Mhz	100 mW (20 dBm)	EN 300 328

1.3. Safety

Your rover needs to be equipped with a functional safety circuit able to fully disconnect any power stage from the voltage source in case of an emergency. This should be implemented with a secure and easily accessible e-stop button wired in series with the main voltage source of the vehicle.

The vehicle shouldn't have any exposed bare wires that risk short circuiting with other vehicles or conductive objects during the competition.

The battery should be charged with a CC/CV Li-Ion charger designed specifically for the battery used. In no case should the battery be charged with a homemade device that is not properly rated to charge Li-ion batteries as this could pose a risk of over-charging and potentially lead to a fire.

The battery needs to have a fast-blowing fuse of rated current 10A or less to break the circuit in case of an overcurrent situation due to a short circuit. In no case will a bypassed fuse be accepted into the competition.

1.4. Autonomy

Your rover needs to be able to be remotely controlled by any of the following means:

- A gamepad
- A PC
- A phone application

Your rover should stop and wait at a standstill when no control input is given or when connection is lost (no runaway vehicles).

Your rover should be able to drive forwards, backwards and turn. Your rover can also have more complex routines such as following a curve, driving a set distance and then stopping, or turning a known angle.

If your rover can be controlled remotely without direct line of sight (for example with an operator watching a camera feed), you should inform the judges and will receive extra points for blind task completion.

If your rover can perform complete tasks autonomously (no operator input), you should inform the judges and will receive extra points for autonomous task completion.

If you decide to return to a simpler control mode, your extra points will be deduced from your score as the task (or parts of it) were not achieved fully blind/autonomously.

2. Team Area

Each team will be assigned a team area with a table, two chairs, a monitor and power source.

The teams are encouraged to decorate their personal team area to the color of their team.

The team areas will not have any tools or electronics soldering equipment to keep them as clean operator consoles to remotely pilot the rovers.

All prototyping equipment for hardware will be offered at the "Hardware Repair Zone".

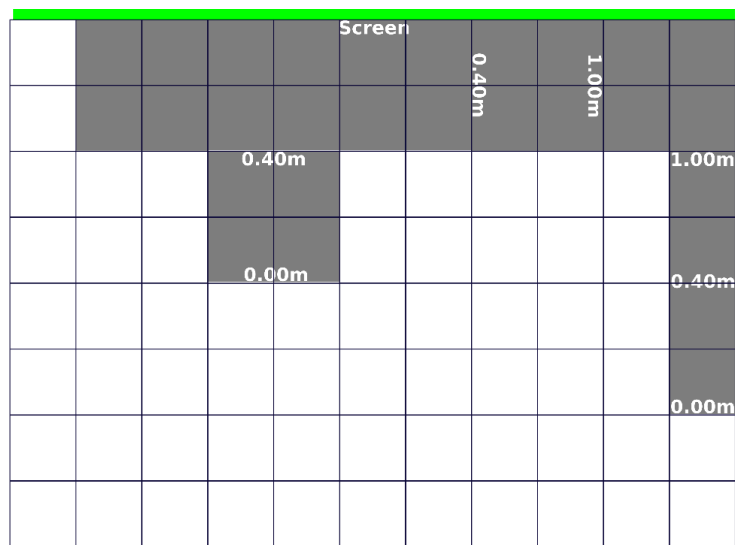
The judges will be sitting at the "Judges Desk" to judge all the various tasks.

The audience chairs will be offered to all the audience members for the presentation task. The pitch will be given while standing on the grey modules placed right below the main screen.

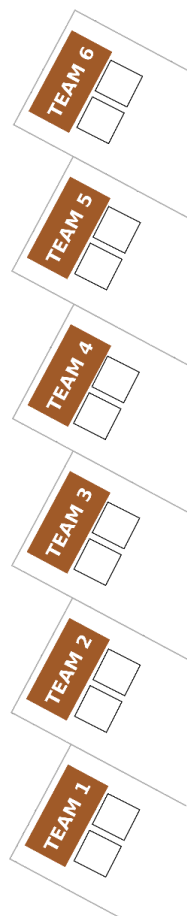
The main screen will be displaying a real time counter of the points that each team has obtained throughout the various tasks.

The audiovisual stage is where the mics, screen and lighting conditions will be controlled from.

A photobooth will also be installed to take proper images of the teams' creations.



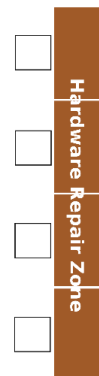
1m
1m
Competition Grid Scale



Judges Desks



Audience Chairs



Audiovisual Stage

3. Competition Tasks

The tasks will be split in two time slots, morning tasks and afternoon tasks:

Team Setup - 08h15 to 09h00	Team Zone Setup	
Presentation Task - 09h00 to 10h00	(1.1) Presentation	(1.2) Photoshoot
Individual Tasks (1) - 10h00 to 12h00	(2) Navigation	
Lunch Break - 12h00 to 13h00	Lunch Break	
Individual Tasks (2) - 13h00 to 14h00	(3) Manipulation	
Group Tasks - 14h15 to 15h30	(4) Tug-of-War	(5) Race
Prize Giving - 15h30 to 16h00	Prize Giving	

3.1. Presentation & Photoshoot - 1h00

Each team will have 6 minutes to present their entire year's worth of work and the capabilities of their rover to the audience before competing in the technical tasks.

Following are the various points that will be expected from each team:

1. Team Presentation - 1 minutes
 - a. Team name & Logo
 - b. Members of the team & their field of expertise
 - c. Prior experience in robotics engineering
2. System Engineering - 2 minutes
 - a. General system overview of the rover & features
 - b. Year long timeline
 - c. Work repartition between team members & interfaces
 - d. Testing & system validation
3. Detailed Work Presentation - 3 minutes
 - a. Mechanics
 - b. Electronics
 - c. Software
4. Questions & Scrutiny - 3 minutes
5. Photoshoot - 1 minute

(1) Presentation - Scoring Sheet	
Quality of Slides	20 points
Clarity of Oral Presentation	20 points
System Engineering	40 points
Detailed Work Presentation	80 points
Questions & Scrutiny	50 points
Final Product Quality/Esthetics	40 points
Total Points Obtainable - 250 points	

3.3. Navigation - 2h00

The **initial 30 minutes** of the task are freely given to the various teams to test their navigation pipelines and tune their parameters for the terrain of the competition. All teams will be testing simultaneously so it is left to the team members to pilot with care towards the other teams.

The **following 1h30** are left to each of the teams for the graded navigation task, each team will be granted 12 minutes to perform the task with a 3 minutes buffer to reset the navigation terrain and leave some time for the judges to deliberate on the grading of each team.

The purpose of the navigation task is to show the ability of your rover to precisely navigate around a complex terrain while keeping track of its current location and obstacles around it.

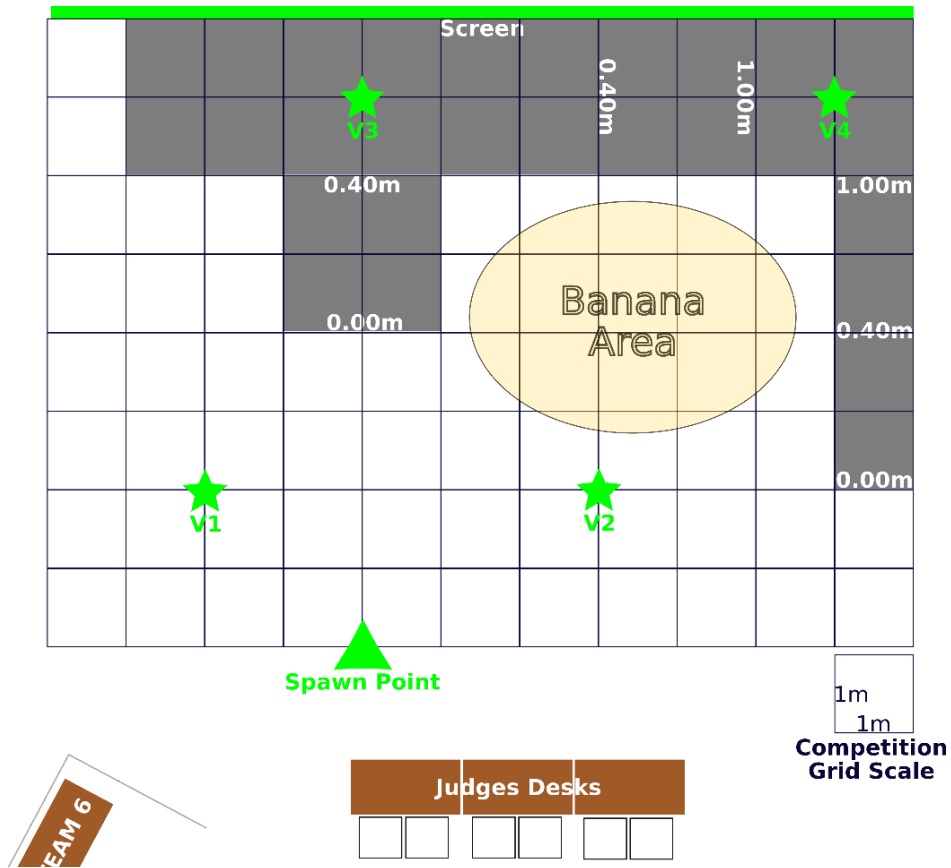
Your rover will start at the **spawn point**, it will then need to navigate across to four key vantage points **in order**:

- **V1, V2** are on the floor at the same height as the spawn point
- **V3** is on an elevated platform at a height of 400 [mm]
- **V4** is on an elevated platform at a height of 1000 [mm]

Between **V2** and **V3**, in a clearly defined boundary area but at an undisclosed spot, there will be a **single banana** placed on the floor. It is the team's job to find this banana, approach it, butt the rover's nose against it and pause for a few moments to show that it has been reached.

The rover must pause at every waypoint it reaches for a duration of at least 5 seconds for the judges to measure the distance between the waypoint and the closest point on the rover. If this distance is above 300 [mm], the waypoint will be considered not reached.

Finally, the rover must return to the **spawn point** to be granted the final vantage point.



Navigation Map 2026 - Version 1.0.0

(2) Navigation - Scoring Sheet	
V1 Reached (< 30cm)	20 points
V2 Reached (< 30cm)	20 points
Banana Reached (< 30cm)	30 points
Banana Booped (< 0cm)	+20 points
V3 Reached (< 30cm)	30 points
V4 Reached (< 30cm)	40 points
Successful Return to Spawn (< 30cm)	20 points
Vantage Point not Reached in Order	-10 points
Rover Touched	-20 points
Rover Picked Up	-50 points
Total Points Obtainable (line-of-sight) - 180 points Total Points Obtainable (camera-feed) - 360 points Total Points Obtainable (autonomous) - 720 points	

3.3. Manipulation - 1h00

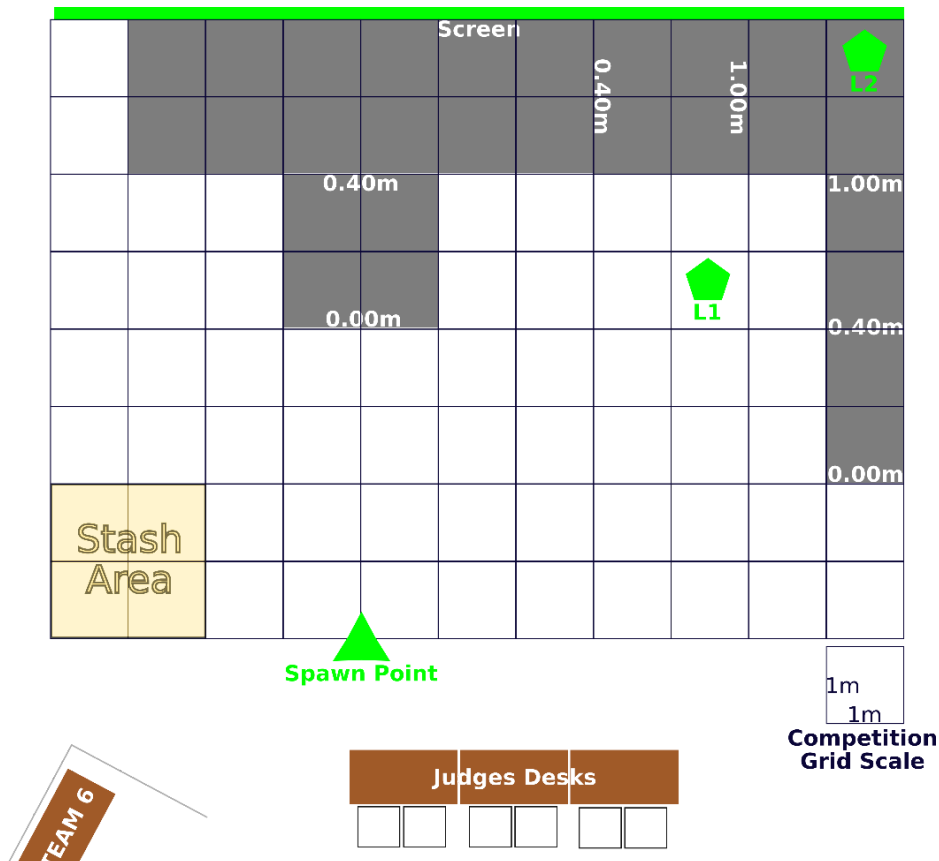
This task is done by each team individually, each team having 8 minutes with 2 minutes of buffer for the judges to reset the terrain.

Teams must include a hook somewhere on their rover to grab the load, it can be an actuated hook (or arm) or it can be a static system. They may also push the load around without losing any points although it is not recommended as it could take an extended amount of time.

Load 1 will be a 500 [gram] basket set on the floor attached to a horizontal hoop at a height of 100 [mm] designed to be hooked into. The hoop will be of circular shape with a diameter of 12mm.

Load 2 will be a 200 [gram] basket set on the floor attached to a smaller horizontal hoop at a height of 100 [mm] designed to be hooked into. The hoop will be of circular shape with a diameter of 12mm.

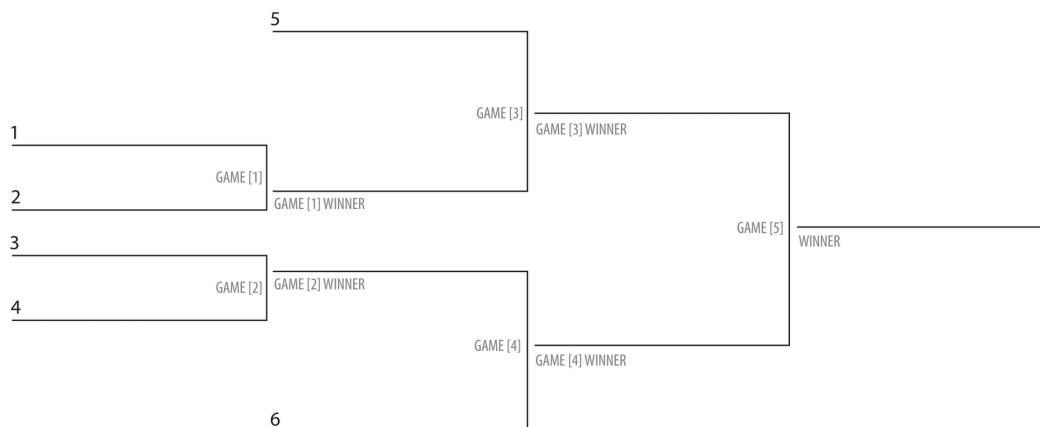
The team will need to drag load 1 from a pickup location marked by tape on the floor to a dropoff location, also marked by tape on the floor. The team will then need to unhook from load 1, drive to a second location (also marked by tape), hook into a load 2 which will be smaller and more delicate. They will then need to drag it back to the first dropoff location and unhook it precisely.



(3) Manipulation - Scoring Sheet	
Successful Hooking	20 points
Successful Drop Off (in Stash Area)	30 points
Successful Unhooking	30 points
Unhooking by Hand	-20 points
Total Points Obtainable (line-of-sight) - 160 points Total Points Obtainable (camera-feed) - 320 points Total Points Obtainable (autonomous) - 640 points	

3.4. Tug of War - 0h30

This task is done in the form of a 3-round bracket with byes, see below:



The teams are drawn at random using an online randomised drawing tool.

Each match is won by playing out 3 rounds, each one of them on different surfaces:

1. Wood
2. Carpet
3. Gravel

Teams must include a hook centered at the back of their rover to tie a strap to.

A tug of war setup will be prepared. Both rovers start back-to-back on the center line and accelerate from the get-go of the judges. The rope has a total length of 1 meter so 500 [mm] on either side of the center line. The first one who pulls the other past the center line wins the round.

The winner of the round moves on to the next round.

(4) Tug-of-War - Scoring Sheet	
Winning the quarter-finals match	20 points
Winning the semi-finals match	40 points
Winning the finale match	100 points
Total Points Obtainable - 160 points	

3.5. Race - 0h30

This task is done by every team simultaneously.

A race around a novel circuit will be organised between all the rovers, the circuit is not announced prior to the competition as to make the teams develop a flexible system with a good balance between tire grip, torque and acceleration. In addition, an intuitive and robust controller mapping needs to be developed for precise real-time control.

Here are some key features which will be present during the task:

- Switchbacks
- Ascending ramps of a max inclination of 25 degrees (or 46% grade)
- Gravel and other surfaces

(5) Race - Scoring Sheet	
1st Place	150 points
2nd Place	100 points
3rd Place	60 points
4th Place	30 points
5th Place	20 points
6th Place	0 points
Total Points Obtainable - 150 points	

Touching the rover at any moment nets -20 points, carrying it over an obstacle nets -50 points.

4. Grading Overview

Complete Overview of Tasks			
	line-of-sight	camera-feed	autonomous
(1) Presentation	250		
(2) Navigation	180	360	720
(3) Manipulation	160	320	640
(4) Tug-of-War	160		
(5) Race	150		
Maximum	900	1240	1920

A full grading sheet will be produced for the judges.