Cyberspace Challenges Rules

1   General Information

„Fun while Learning, Sharing, Teamwork" despite Covid-19 -
RoboRAVE Germany goes Cyberspace!

RoboRAVE Cyberspace is the online competition of RoboRAVE Germany.

We have expanded the Open Roberta Lab and developed new challenges especially for RoboRAVE Cyberspace. Equip your robot model with sensors and program it to find its way around new tracks in the 2D simulation.

Here you will find the most recent RoboRAVE Cyberspace Challenges cyberspace.roborave.de.

Depending on the challenge, the tracks will not be published for scoring until the day of the competition.

1.1   Rules of Play

- Each team can submit one solution per hour, which will be played for scoring by the organisers in their simulation and - if possible - streamed live.

- The behaviour of the simulation depends on the hardware of the computer. Teams should be prepared to engineer around this technical condition.

- Depending on the challenge, the robot has a certain number of minutes to complete the tasks.

- If the robot gets stuck in the simulation, i.e. if no progress can be observed for several seconds, the run may be aborted by the organisers. The organisers decide when to abort the run. In the case of an abort, the achieved partial points are taken into account, but not the remaining time.

1.2   Divisions

The teams of the RoboRAVE Cyberspace Challenges compete in different divisions:

- ES – Elementary School: below 10 years of age

- MS – Middle School: 10 - 13 years of age

- HS – High School: 14 - 20 years of age

In RoboRAVE Cyberspace the teams may choose the division regardless of their actual age. Each team must commit to a single division for RoboRAVE Cyberspace, which then applies to all challenges. The division determines the difficulty and the prize money to be won.

1.3   Scoring

The total score is the sum of the points from:

- Completing the track to the respective destination. The tracks are divided into sections. For each completed section there are sub-points as indicated in the point tables of the challenges.

- Remaining time in seconds. A certain time is set for each challenge. If the track is completed to the finish before this time has elapsed, the remaining seconds are added to the total score.

2   Line Following Challenge

2.1   Goal

Configure and program a line-following robot that can follow a black line on a white background to a „tower" (TOWER) within two minutes and then return to its starting point (HOME).

2.2   The Track

- Tracks for practising are available at cyberspace.roborave.de

- Division ES – no intersection, 1,25 cm black line

- Division MS – one intersection, 1,25 cm black line

- Division HS – two intersections, 0,75 cm black line

- A new design is created each year.

- There will be a minimum of 20 cm of straight line leading into the tower.

- Home and Tower are marked by a colour-coded rectangular obstacle.

- The line will be no closer than 10 cm from the edge of the track or any other line.

- Advertisement, or printed instructions can be placed anywhere on the track surface, but must be a minimum of 10cm from any line

- Curves can have different/changing radiuses, but no part of the curve can have a radius less than 15cm for ES & MS, and 10cm for HS divisions.
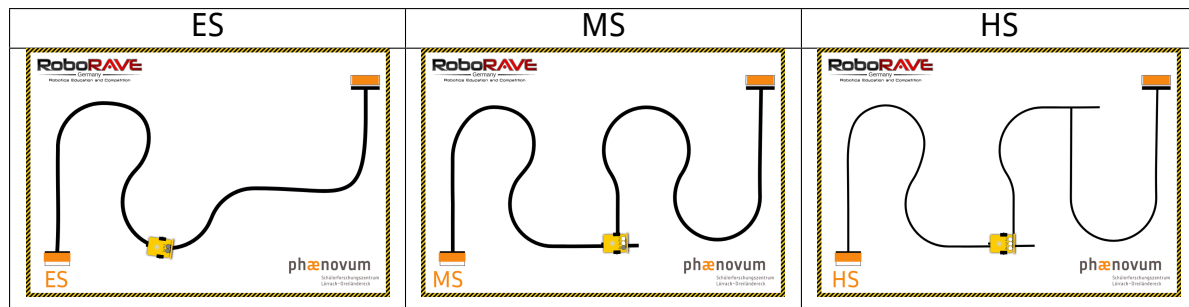
ES	MS	HS

Tabelle 1: **Track Examples.**

*Tracks shown are an **example**. The design changes every year and are revealed on the first day of an event.*

2.3 Scoring

Scores according to the scoring table plus remaining time in seconds.

	Leaves Home	Passes 1st Intersection	Passes 2nd Intersection	Stops at Tower
ES	50	n/a	n/a	100
MS	25	25	n/a	100
HS	25	25	25	50

	Starts Back Home	Passes 1st Intersection	Passes 2nd Intersection	Returns Home	Total
ES	50	n/a	n/a	100	400
MS	25	25	n/a	100	400
HS	25	25	25	100	400

3 Labyrinth Challenge

3.1 Goal

Configure and program a robot that can (in three minutes) find its way through a maze of obstacles to its destination by means of sensors (not exclusively the rotation sensors of the motors).

3.2 The Track

- Tracks for practising are available at cyberspace.roborave.de

- Division ES – no dead end

- Division MS – one dead end

- Division HS – two dead ends

- A new design may be created each year.

- The corridors of the labyrinth are at least 20 cm wide

- The corners of the labyrinth are always rectangular, the walls are always horizontal or vertical.

- The goal is marked by a square obstacle highlighted in colour.

- Advertisement, or printed instructions can be placed anywhere on the track surface, but must be a minimum of 10cm from any line
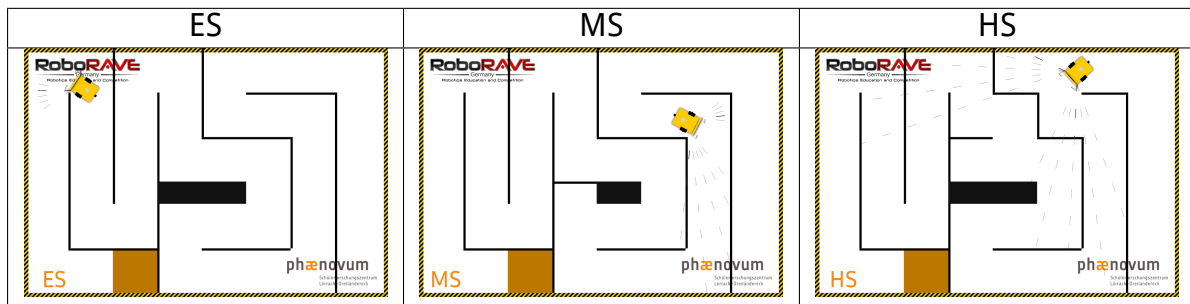

Tabelle 2: Track Examples.

*Tracks shown are an **example**. The design changes every year and are revealed on the first day of an event.*

3.3 Scoring

10 points per aisle covered plus remaining time in seconds. An aisle is limited by start, corner(s) or finish.

4 Rainbow Challenge

4.1 Goal

Configure and program a robot that detects (in five minutes) the coloured paths by means of sensors and travels along them in the order of the colours of the rainbow to the obstacle and back.

4.2   The Track

- Tracks for practising are available at cyberspace.roborave.de

- Each path has a different colour.

- Division ES – 4 Paths, colour and shape of the paths do not change.

- Division MS – 4 paths, shape of the paths does not change, their colour is random.

- Division HS – 6 paths, shape of the paths does not change, their colour is random.

- Colour codes:

Farbe	RGB (Hexadecimal)	Red	Green	Blue
Red	e40303	228	3	3
Orange	ff8c00	255	140	0
Yellow	ffed00	255	237	0
Green	008026	0	128	38
Blue	004dff	0	77	255
Purple	750787	117	7	135

- Division ES/MS – the paths can take the colours red, yellow, green and blue That is 24 possible combinations.

- Division HS – the paths can additionally take on the colours orange and purple. That is 720 possible combinations.

- The centre circle is surrounded by an edge, which is detected by the robot as grey and differs from the colours of the paths.

- Division ES/MS - the centre circle is filled black.

- Division HS - the centre circle is filled white.

- The background of the track does not contain the colours of the paths.

- Division ES/MS - the background of the track is detected as grey with white patterns by the colour sensor.

- Division HS - the background of the track is detected as black with grey patterns by the colour sensor.

- The end of the paths is marked by a rectangular obstacle highlighted in colour

- Division ES/MS - the path are about 10 cm wide

- Division HS - the path are about 5 cm wide

- Division ES/MS - the corners of the paths are always right-angled, the paths always run horizontally or vertically.

- Division HS - the corners of the paths can have any angle.

- Advertisements or printed instructions can be placed anywhere on the board, but not behind the paths

- A new design may be created each year.
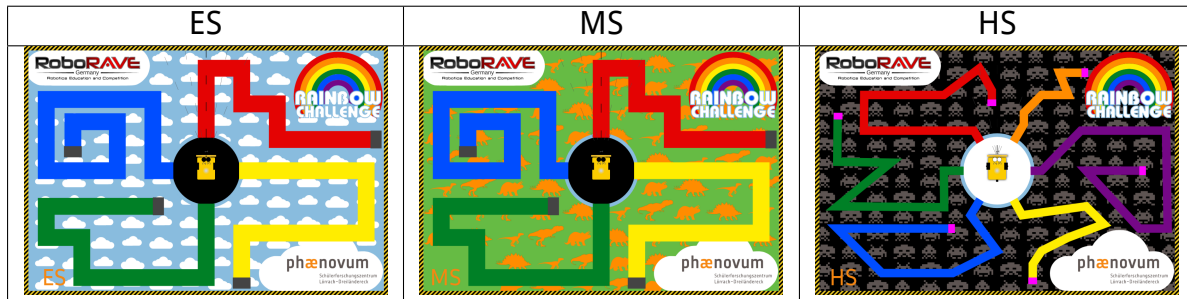
ES	MS	HS

Tabelle 3: Track Examples.

4.3 Scoring

For each start from the correct path 10 points, 10 more points for driving to the end of the path and another 10 points for driving back to the centre circle, plus remaining time in seconds.