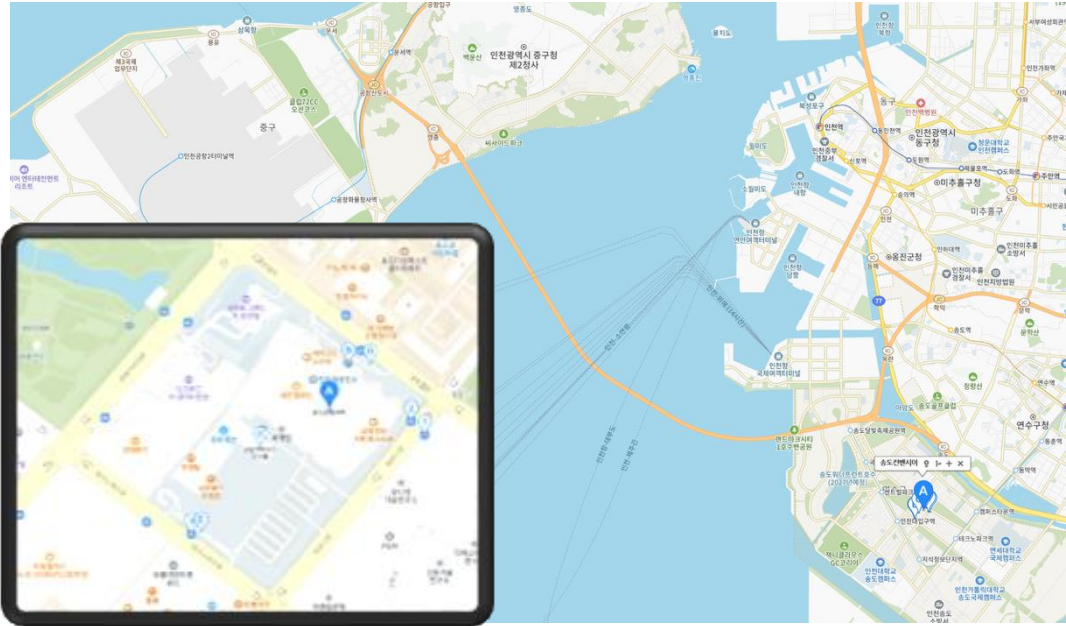


29th Roboracer Autonomous Racing Competition Orientation

2026, August 24th ~ 27th

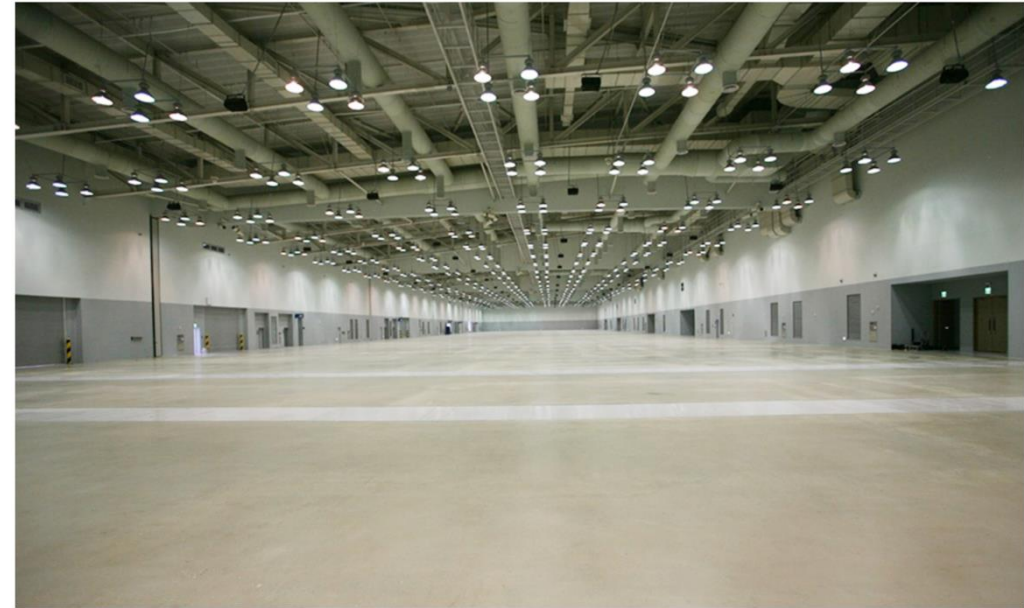
Competition Overview

- **IFAC (International Federation of Automatic Control)**
 - August 23(Sun)~ August 28(Fri), 2026
 - **Roboracer Competition:
August 24(Mon)~ August 27(Thu), 2026**
 - Bexco, Busan, South Korea



Projected Competition Place

BEXCO Exhibition Center 2, 3rd floor Hall 5A



Hall 5 (3F)

Slippery Surface

Projected Competition Place

Roboracer
Competition Area



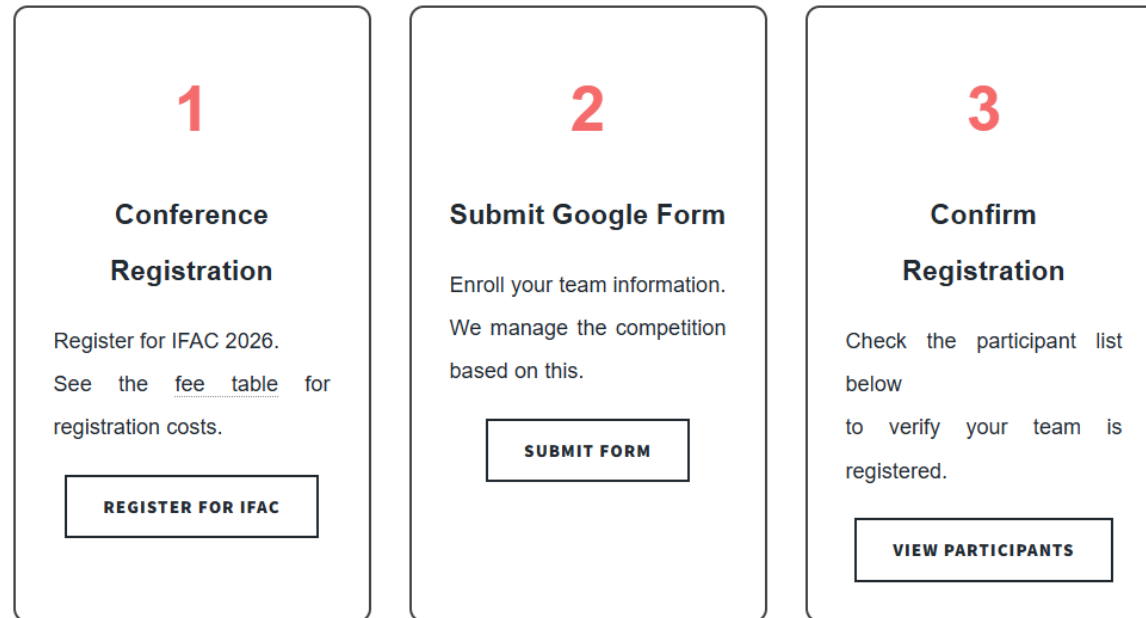
Homepage Info.

- The IFAC 2026 Roboracer homepage is open
 - <https://2026ifac-robocer.com/en/registration.html>
- Competition information, rules, and registration (~8.9th) are available through the website.



Registration(~8.9th)

REGISTRATION



If you completed steps 1 & 2 but your team is not listed, please contact ryujs@unist.ac.kr.

You can submit google form first

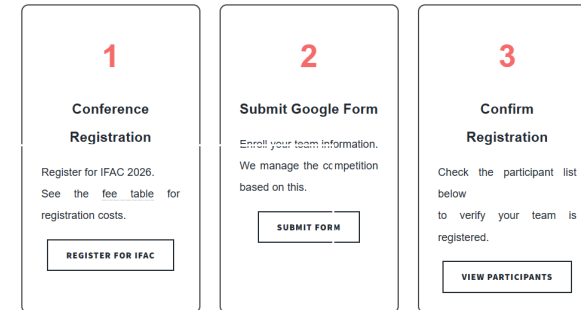
Registration(~8.9th)

- **Conference Registration**

- https://ifac2026.org/fairContents.do?FAIRMENU_IDX=21697&hl=ENG

- Every team member must individually register for IFAC — not just the team leader.
- If you have already registered for IFAC under any category, you do not need to add the competition option separately.

REGISTRATION



If you completed steps 1 & 2 but your team is not listed, please contact ryuj@unist.ac.kr.

ON-LINE REGISTRATION (FEB. 1 - AUG. 9, 2026)

€ 100

ON-SITE REGISTRATION (AUG. 22 - 28, 2026)

€ 140

Registration(~8.9th)

- **Competition Google Form Submission**

- <https://docs.google.com/forms/d/e/1FAIpQLSdJg-bRTA8269yDE7EInUQxiU9iTom4lwIJWPxlzpfVzsc8A/viewform>
- **No additional charge**
- Submission per team
- Hardware spec, brief algorithm description and etc.

29th Roboracer Autonomous Racing Competition

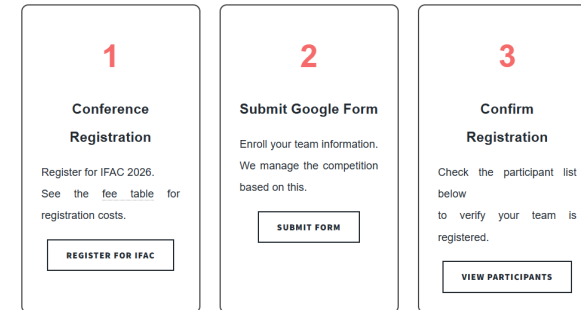
Roboracer Autonomous Racing is a semi-regular competition organized by an international community of researchers, engineers, and autonomous systems enthusiasts. The teams participating in **29th Roboracer CHAMPIONSHIP** will build a 1:10 scaled autonomous race car according to a given specification and write software for it to fulfill the objectives for the competition: Don't crash and minimize the lap time.

The registration for the 2026 29th Roboracer autonomous racing competition is **26.06.30**

Upon completion of the registration process, it is mandatory to **join the official Slack channel**.

Any inquires please contact to email below
ryujs@unist.ac.kr

REGISTRATION



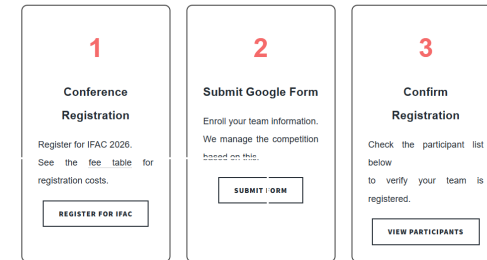
If you completed steps 1 & 2 but your team is not listed, please contact ryujs@unist.ac.kr.

Registration(~8.9th)

- **Confirm your status**

- <https://2026ifac-roboracer.com/en/registration.html#participants>

REGISTRATION



If you completed steps 1 & 2 but your team is not listed, please contact ryuj@unist.ac.kr.

PARTICIPANTS

If you have registered for participation but the list below is not updated, please contact us at ryuj@unist.ac.kr.

TEAM NAME

AFFILIATION

TEAM MEMBERS

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Tentative Timeline

DATE	IN-PERSON COMPETITION
Feb 1 st	Registration opens
June 12 th 20:00 KST	1 st Orientation (via Online)
Late July	2 nd Orientation (via Online)
Aug 9 th 23:59 KST	Registration closes
Aug 24 th	On-site team reception and regulated practice sessions
Aug 25 th	Open practice sessions
Aug 26 th	Qualification time trials
Aug 27 th	Head-to-head tournament and award ceremony



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Tentative Competition Schedule

Timeline	Day1
10:00	Registration
12:00	Mapping & Inspection
15:00	Group Practice
18:00	Open Practice
21:00	Close Track

Timeline	Day2
10:00	Group Practice
15:00	Qualifying
18:00	Open Practice
21:00	Close Track

Timeline	Day3
10:00	Group Practice
14:00	Half of head-to-head races
18:00	Open Practice
21:00	Close Track

Timeline	Day4
10:00	Group Practice
11:00	Half of head-to-head races
16:00	Ceremony & Workshop

Under the double elimination format, no teams will be eliminated on the third day. The losers' bracket will start on the Day 4.

Example of tournament Bracket



Winners Bracket



Losers Bracket

Example of tournament Bracket



This races will be start at Day4

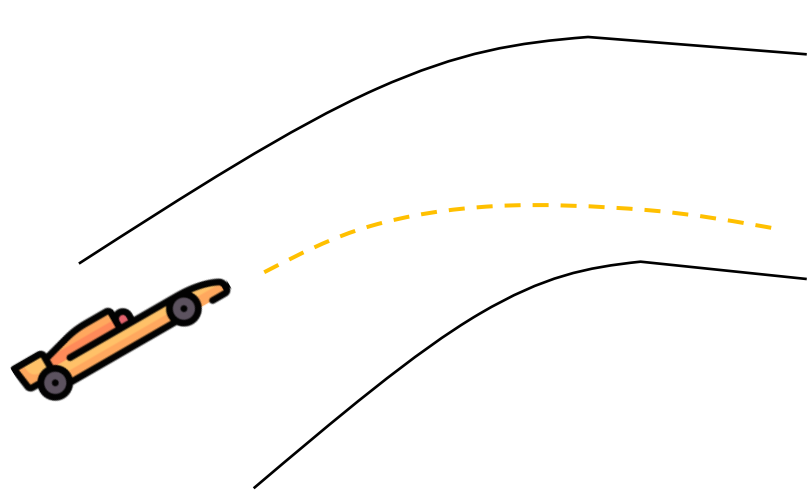
← **Winners Bracket**

← **Losers Bracket**

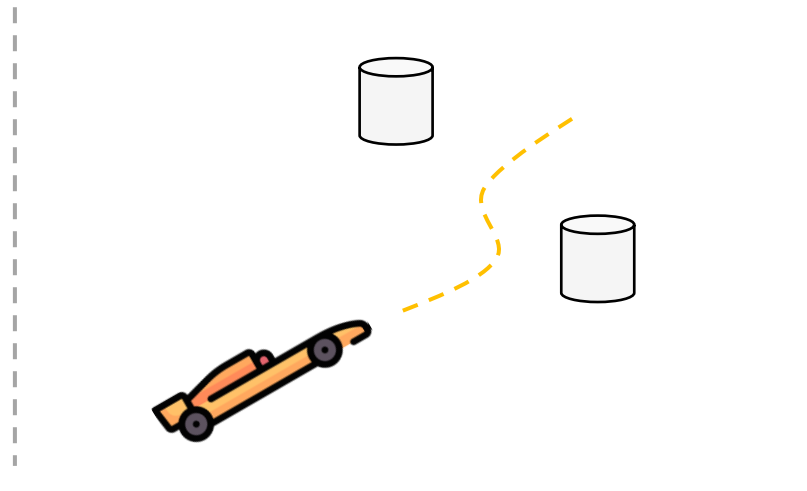
RoboRacer Theme

RoboRacer Theme

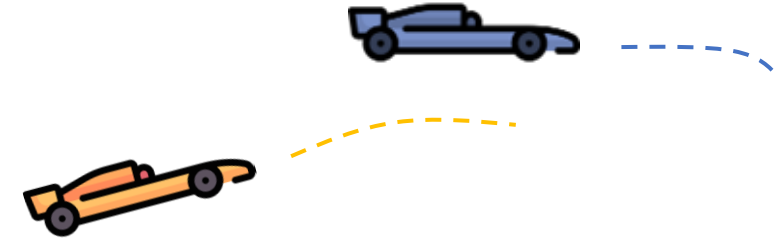
- Safer! Faster! More Precise!



Minimum Lap Time



Obstacle Avoidance



Adversarial Strategy

Full Autonomous Racing System (Perception/Planning/Control)

RoboRacer Theme

- **Key changes & challenges in the competition**

- Manual stop by a human to avoid collision (ex. Use joystick)
- Race focused on the optimal path
- Parameter tuning during the race



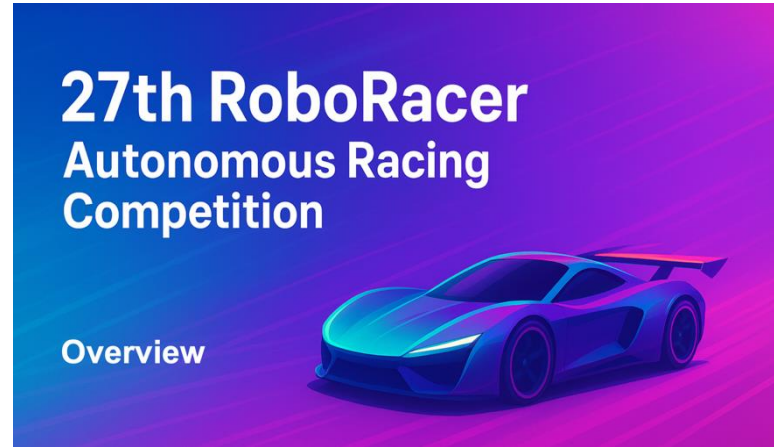
- **No manual intervention** during race (Fully autonomous system)
- Opponent **detection, avoidance** and **interaction** is more emphasized → precise **decision-making** is now crucial
- **Parameter adjustments** allowed only when the car is stationary

Recent Competitions

- 2026 PNU-HYUNSONG (01.25-01.27, Busan, Korea)



- 2026 ICRA (06.01-06.04, Vienna, Austria)



Phases Overview

Phases Overview

0. Submission of Technical Materials

1. Registration & Car Inspection

2. Mapping & Practice Session

- Mapping
- Group Practice
- Open Practice

3. Qualification

- Divide into Q1, Q2, Q3

4. Head-to-head

- Standing Start
- Finish 20 laps before the opponent
- Unknown random obstacles

Phase 1: Car Inspection

- **Software inspection (Emergency Stop)**
 - Make **on-off toggle** for mode switch (Autonomous <-> Human Control)
 - When the car is autonomous mode, **do not hold any button** (ex. Press and hold button)



Phase 1: Car Inspection

- **Hardware Inspection**
- The car is supposedly built according to ROBORACER instructions, but alternative components may be allowed as long as they comply with the **Rules**.
 - Any unclear or ambiguous points should be checked **in advance** with the race organizers.
- The dedicated time slots for the Mapping and Group practice sessions will be designated on a **first-come-first-serve basis**, and only teams that have successfully **completed registration** and **inspection** will be eligible.

Phase 1: Car Inspection

- **Chassis**

- The race is designed with 1:10 Traxxas chassis (e.g., TRA74054, TRA6804R)
- These chassis are recommended, but generally, any chassis within 15% of the Traxxas cars' dimensions is allowed ($238\text{mm} \leq \text{Width} \leq 341\text{mm}$, $454\text{ mm} \leq \text{Length} \leq 654\text{mm}$).
- Both 4WD and 2WD are permitted.

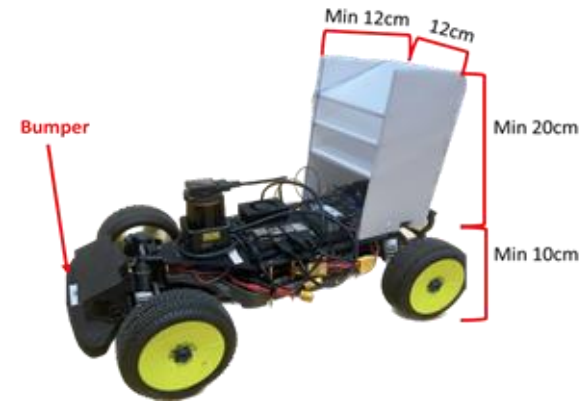
- **Tires**

- No limitations (Both sponge and rubber are allowed)
- However, **chemical additives are strictly prohibited.**



Phase 1: Car Inspection

- **Detection Box (frequently violated and claimed from other teams)**
 - The car has to be easily perceivable by the opponent's LiDAR and/or Camera.
 - Therefore, the car must occupy a space of size **at least** 12×12 cm at every horizontal plane between **10 to 30 cm** above the ground.
 - Ex. From ground 9~31cm(O), 11~31cm(X) , 9~29cm(X)
- **Foam Bumper**
 - It has to be soft to minimize the damage
 - Both **foam** or **honeycomb** are allowed



Phase 1: Car Inspection

- **Motor**

- No Limitation on spec.
- Only single motor can be used in power-train

- **Battery**

- 4s LiPo Battery or lower
 - 3S or lower per battery, and the total voltage must not exceed 4S
- No limit on number of batteries as long as total cell count in series does not exceed 4S
 - Ex) 2s + 2s (series), 4s+4s (parallel) are allowed,

Velion
BRUSHLESS POWER SYSTEM



Phase 1: Car Inspection

- **Main Computation Unit**
 - Only 1 unit
 - No Limitations
 - E.g. Jetson Nano, Jetson Orin, Asus NUC



Phase 1: Car Inspection

- **LiDAR**

- No Limitations, but **only 1 LiDAR** can be used.
- In particular, **3D LiDAR** is also permitted (however, please be aware that high-cost 3D LiDAR units may be damaged in high-speed race).



Phase 1: Car Inspection

- **Camera**

- Both **mono camera** (e.g. Logitech C270, Logitech C920, Raspberry Pi Camera Module V2, Arducam) and **stereo cameras** (e.g. Intel Realsense, ZED) are allowed.
- Cameras that provide additional information such as **detection or VIO results** from onboard processing in camera are **not allowed**. (Depth information is allowed)

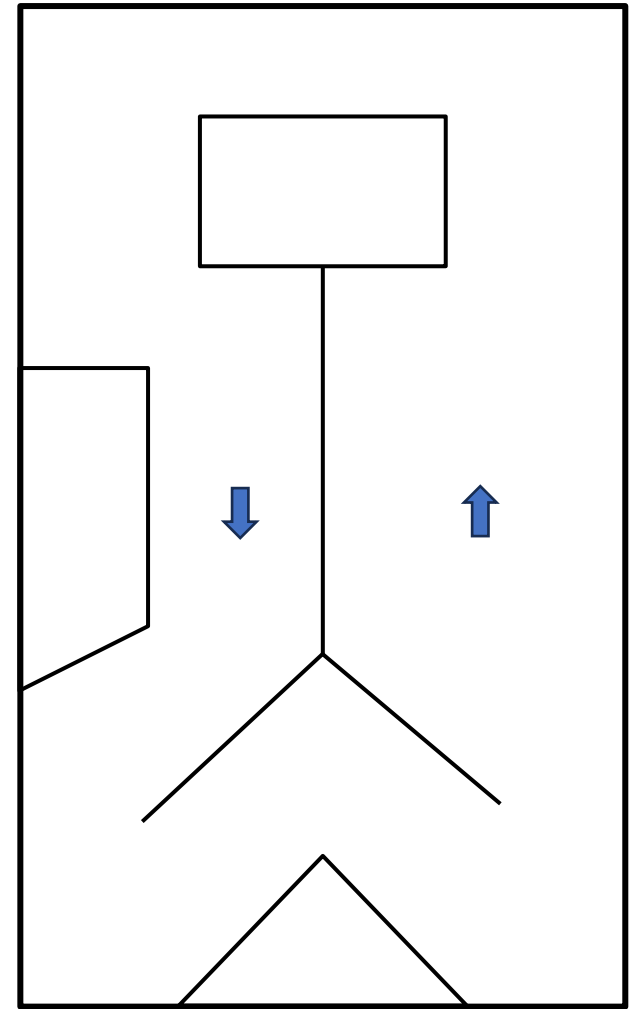
- **Other Sensors**

- Other sensors (IMUs, encoders, custom electronic speed controllers) are **allowed**.
- Indoor GPS sensors (e.g. Marvelmind) **are not allowed**.

Phase 2: Mapping

- **Mapping**

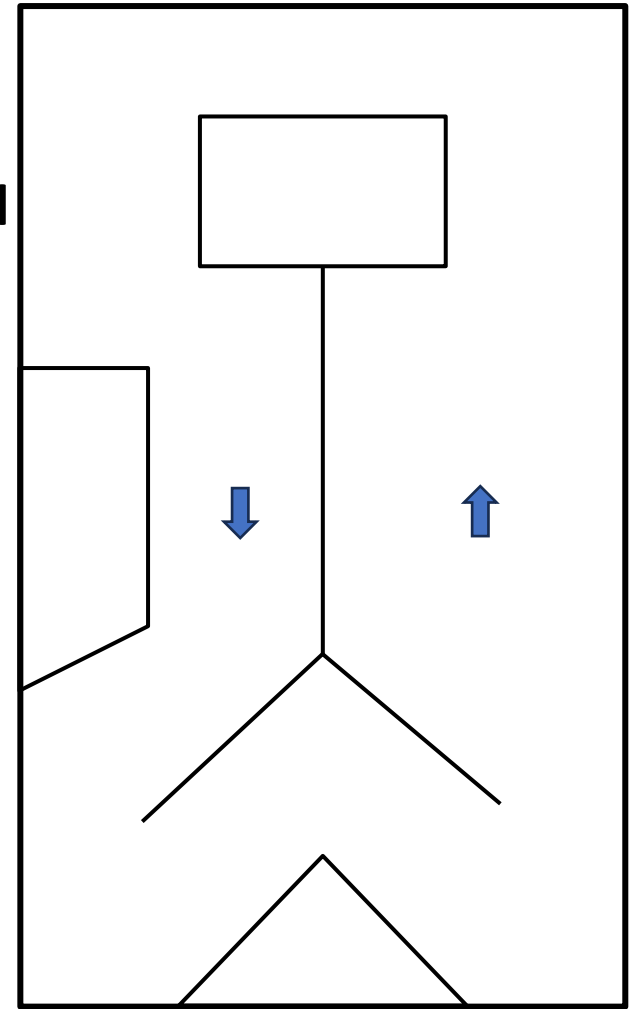
- Teams are divided into groups (about **3 groups**), and **30 minutes** is given to each group
- The **number of groups may vary** depending on the number of participating teams
- In this session, high speed driving is **not** permitted.
 - This will be supervised by referees.
- **Do not make any crash at this session!**
- Multiple cars from a single team on the track is **not** permitted.
- The organizers will provide **track map files (.png, .yaml and .pbstream)**, but do not guarantee the quality.



Phase 2: Practice

- **Practice**

- There will be a **regulated group practice** and **open practice for all team**
- The organizers will provide **sample obstacles**
- The organizers assume **no responsibility** for accidents during practice
- The team involved in an accident must **explain its algorithm** at the request of the referees



Phase 3: Qualifying

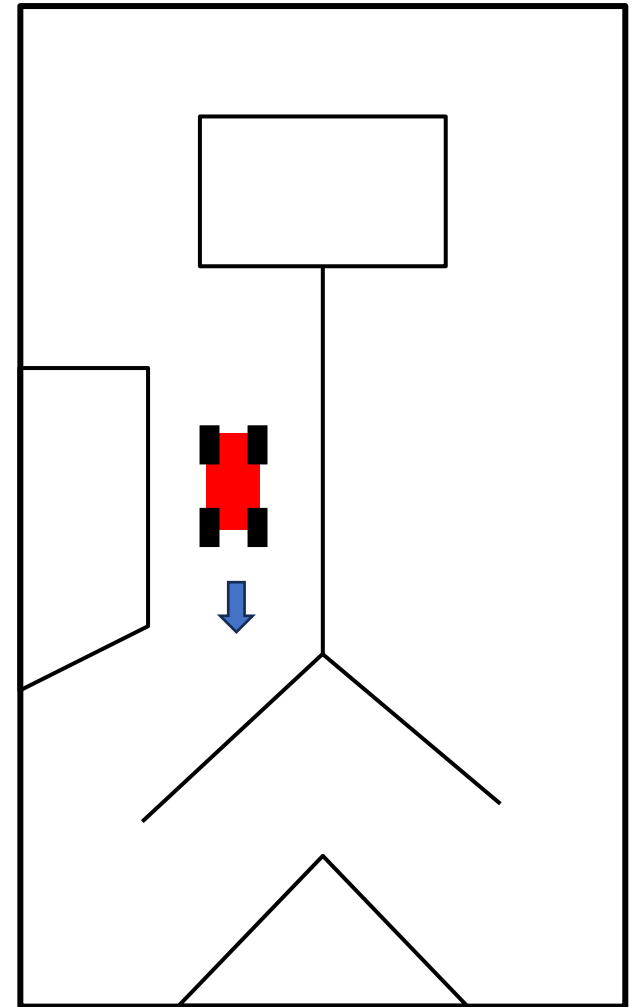
Phase 3: Qualifying

- **Objective**

- Q1 — Complete 3 laps without collision at obstacle-free track
- Q2 — Complete 3 laps without collision while avoiding random obstacles
- Q3 — Achieve the minimum lap time on an obstacle-free track for 2 minutes
- Fully Autonomous (Achievement Condition)

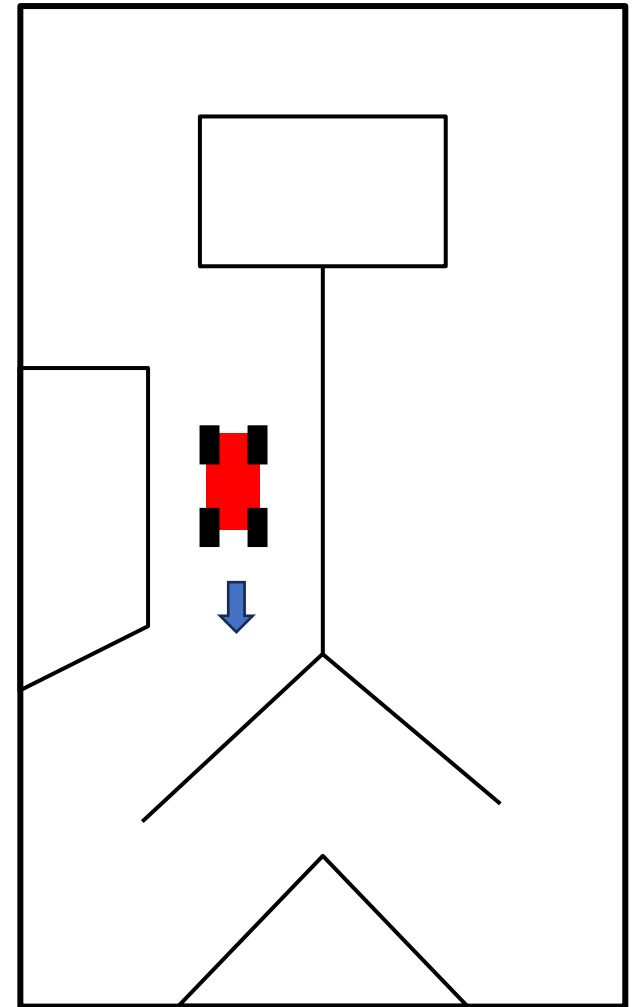
- **General**

- Both practice and qualifying use the same track
- Each team will have 6 minutes of time slot for record.
 - 6 minutes can differ depending on # of teams.



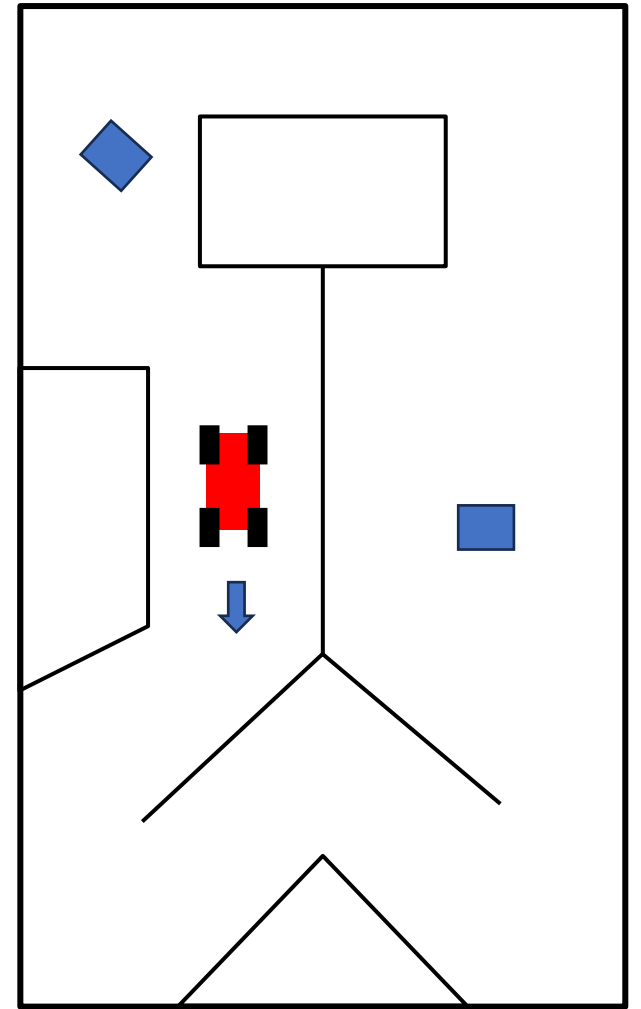
Phase 3: Qualifying

- **Q1 — Complete 3 laps without collision at obstacle-free track**
 - If not passed, ranked by number of laps completed without collision
 - Passing → advance to Q2



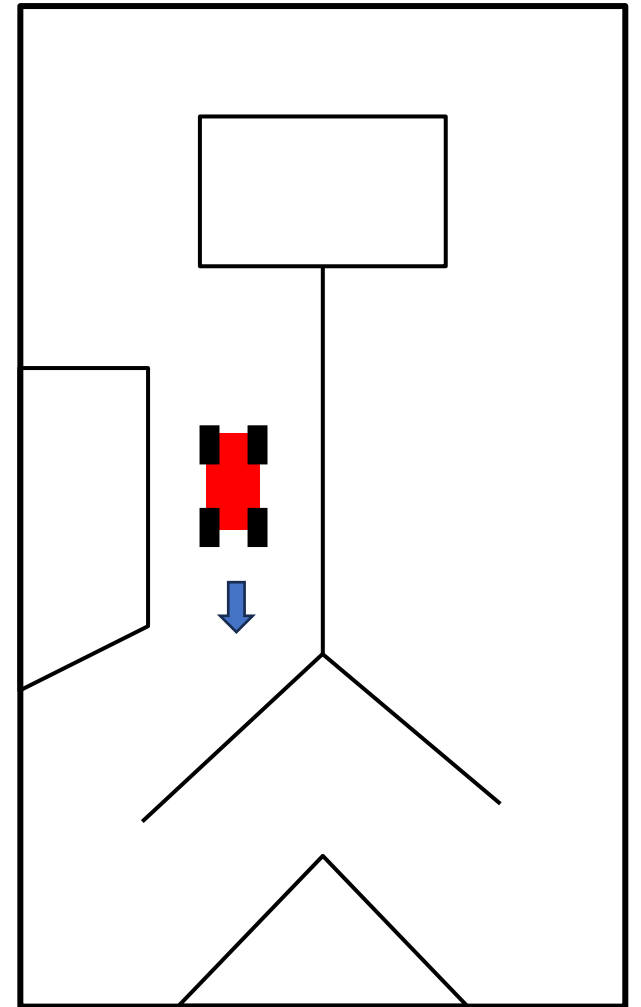
Phase 3: Qualifying

- **Q2 — Complete 3 laps without collision while avoiding random obstacles**
 - 2 random obstacles placed by the referee (positions not announced in advance)
 - If not passed, ranked by number of laps completed without collision
 - Passing → advance to Q3



Phase 3: Qualifying

- **Q3 — Achieve the minimum lap time on an obstacle-free track for 2 minutes**
 - The shortest lap time during the free 2-minute run is used



Phase 3: Qualifying

- **Fully Autonomous (Achievement Condition)**
 - Applies at every moment throughout qualifying
 - Condition: the team exerts no direct or indirect influence on the vehicle during the entire qualifying process
 - "Direct/indirect influence" includes:
 - Touching the vehicle
 - Operating the joystick
 - Touching the keyboard/mouse
 - Operating the computer
 - Recommended: keep hands away from joystick / laptop to demonstrate non-intervention



Example of Qualifying Result

Rank	Fully Autonomous	Q3 (fastest lap)	Q2 (laps)	Q1 (laps)
1	O	10.8 s	3	3
2	O	11.2 s	3	3
3	O	13.0 s	3	3
4	X	9.9 s	3	3
5	X	10.1 s	3	3
6	X	12.2 s	3	3
7	X	13.2 s	3	3
8	X	-	2	3
8	X	-	2	3
10	X	-	1	3
11	X	-	0	2
12	X	-	0	1
13	X	-	0	0
13	X	-	0	0

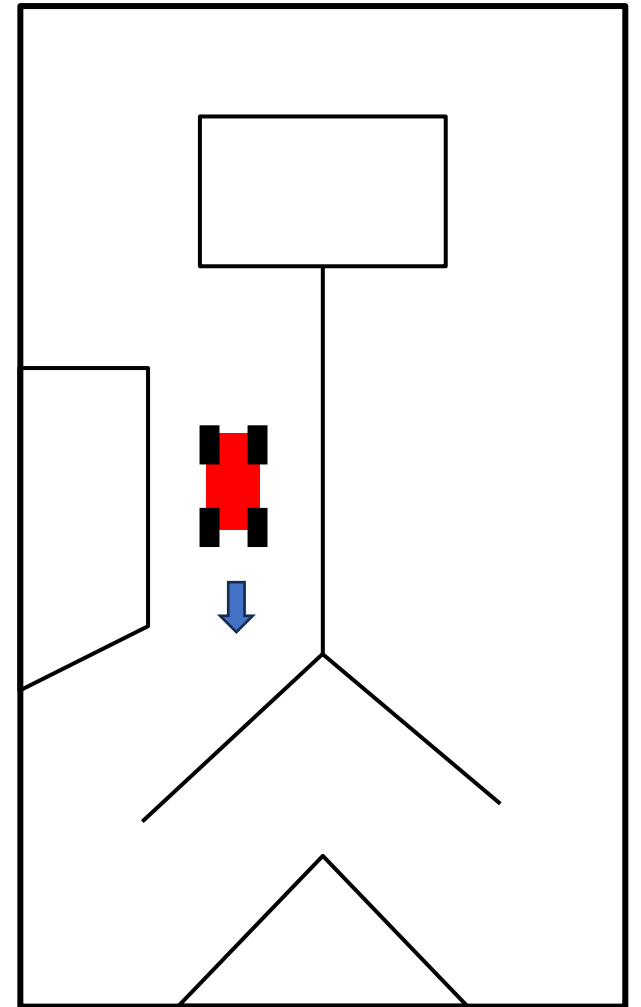
Assume 12 teams;
3 teams pass each of Q1/Q2/Q3, and
3 teams satisfy Fully Autonomous.

Fully Autonomous teams are ranked
first by Q3 time, then Q3 passers,
repeating down to Q1.

Rules for Qualifying

- **Static Obstacles**

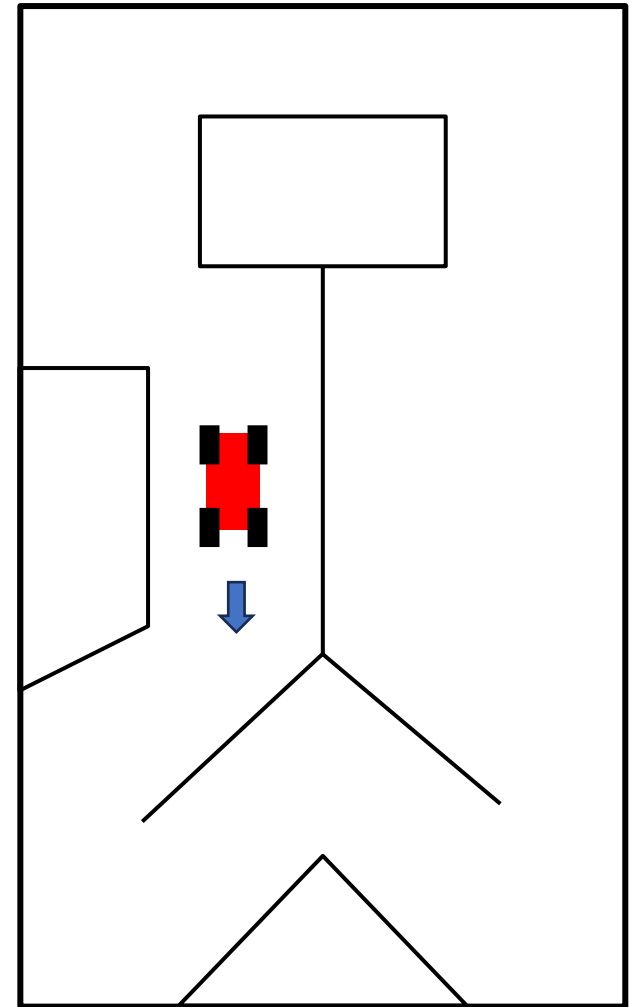
- The random obstacles placed in Q2 are static obstacles
- Each obstacle is smaller than $0.5\text{m} \times 0.5\text{m}$
- Obstacle positions are placed randomly by the referee after Q1 is completed
- Obstacles are removed after Q2 is completed
- Obstacles are safely removed when vehicles are not affected
- There will be a **buffer lap** between each qualifying session (Q1→Q2 and Q2→Q3), but it will not count as a complete lap. During the buffer lap, you need to maintain autonomous mode.



Rules for Qualifying

- **Record Invalidation**

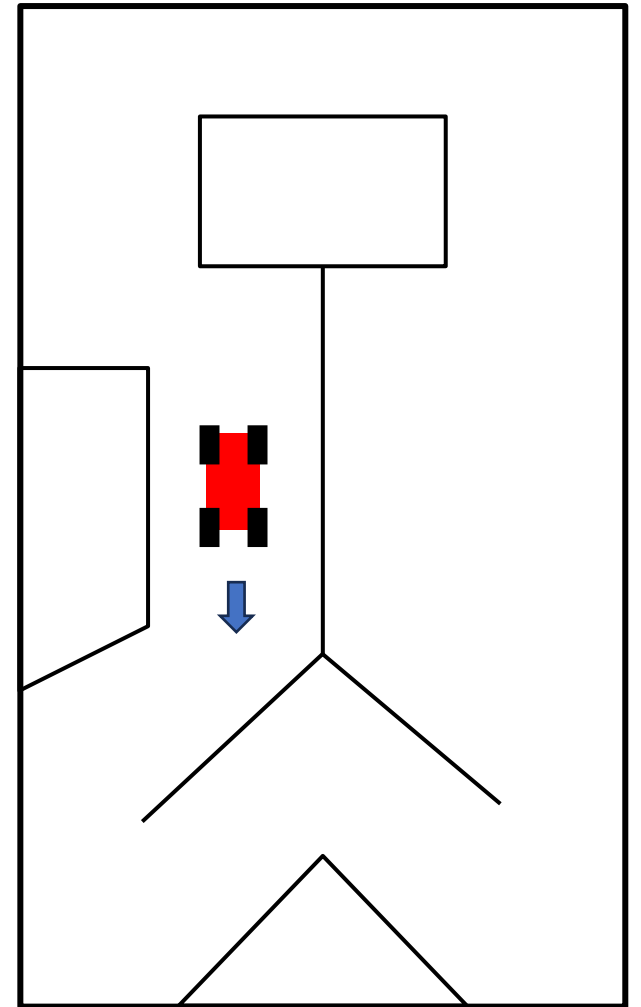
- Invalidates lap time and resets completed lap count if **human intervention** affects the vehicle
- Invalidates lap time and resets completed lap count if **contact with static obstacles** occurs
- If contact with track occurs but driving is possible without human intervention, it is considered minor contact and records remain valid
 - But racing track must be fixed



Rules for Qualifying

- **Precautions**

- **All computation must be performed inside the vehicle!!**
- Manual (human) emergency brakes are strictly prohibited **during general driving**
- If a vehicle is removed from the track, **return it to the exit point**; only slight directional adjustment is allowed



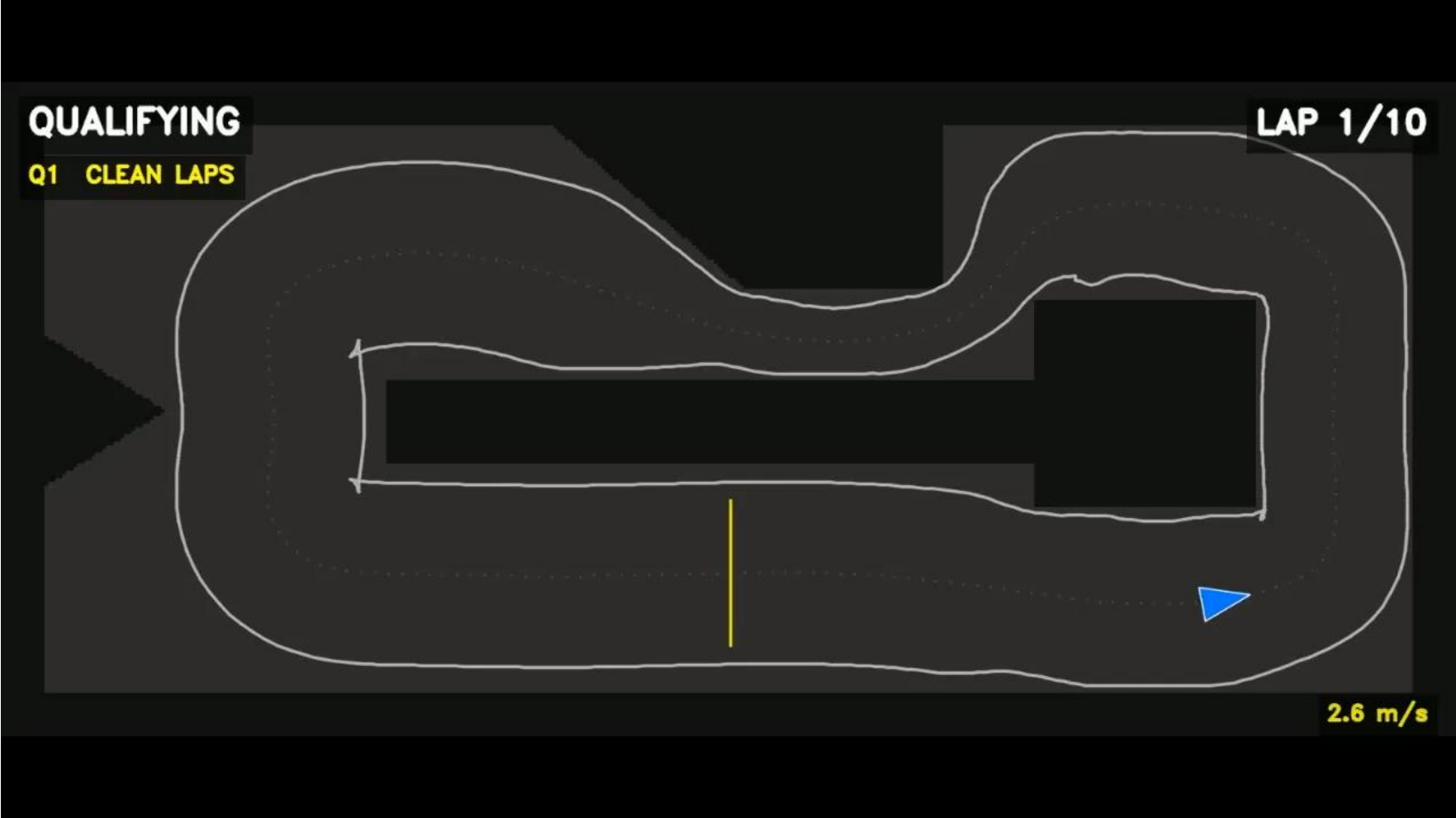
Penalty for Qualifying (One Rank Demotion)

- **Using keyboard, mouse or Joystick during General Racing** (prohibited even if no data transmission occurs)
- **Do not generate or select modified paths manually based on obstacle positions**

Penalty for Qualifying (One Rank Demotion)

- **Exceptions:**
 - To transmit the start signal at start/restart
 - When the vehicle is not on the track
 - To stop after qualifying has ended
 - Transmit an initial guess for re-localization at stationary state.
 - When it need Emergency stop
 - when the referee declares a race stop
 - when driving is impossible due to a collision
 - when stuck on an obstacle for 5+ seconds
 - when the referee permits manual control because the opponent severely damage the track

Qualifying Demo



Phase 4: Head-to-Head

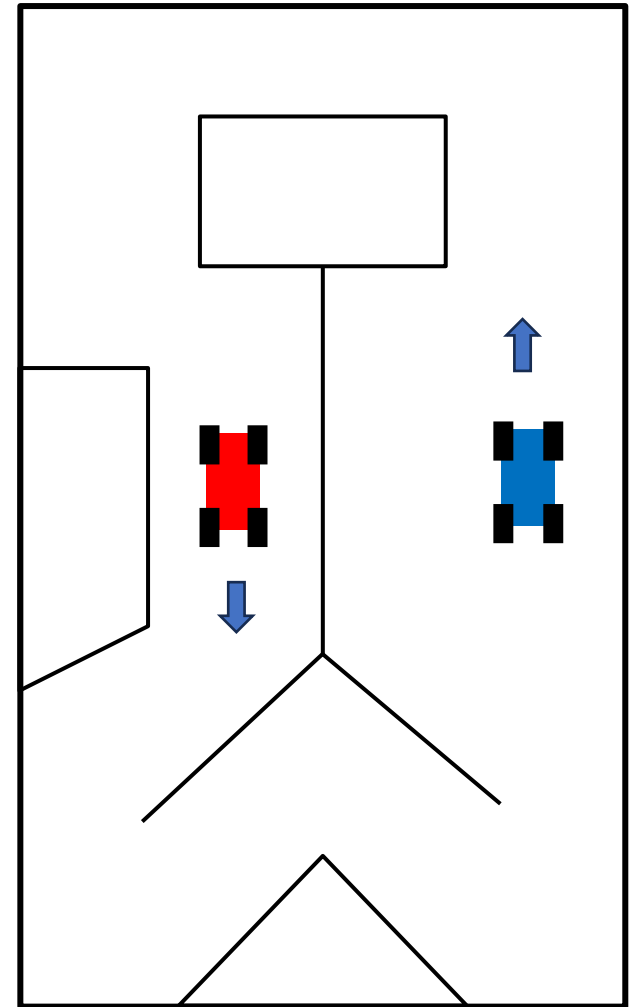
Phase 4: Head-to-Head

- **Objective**

- **Complete 20 laps** first while avoiding obstacles and opponents
 - Races before the quarterfinals may be reduced to 10 laps

- **General**

- Both qualifying and head-to-head race use **same track**
- Two vehicles start from different starting lines positioned in opposite directions
- A total of **3 static obstacles** are used.
 - After all team complete race preparation, each team places one obstacle and the referee places one more
 - The track width must provide a **minimum clearance of 0.5 m**.
- Static obstacles are removed when the leading vehicle **completes the half of total laps**
- **Double elimination tournament**



Phase 4: Head-to-Head

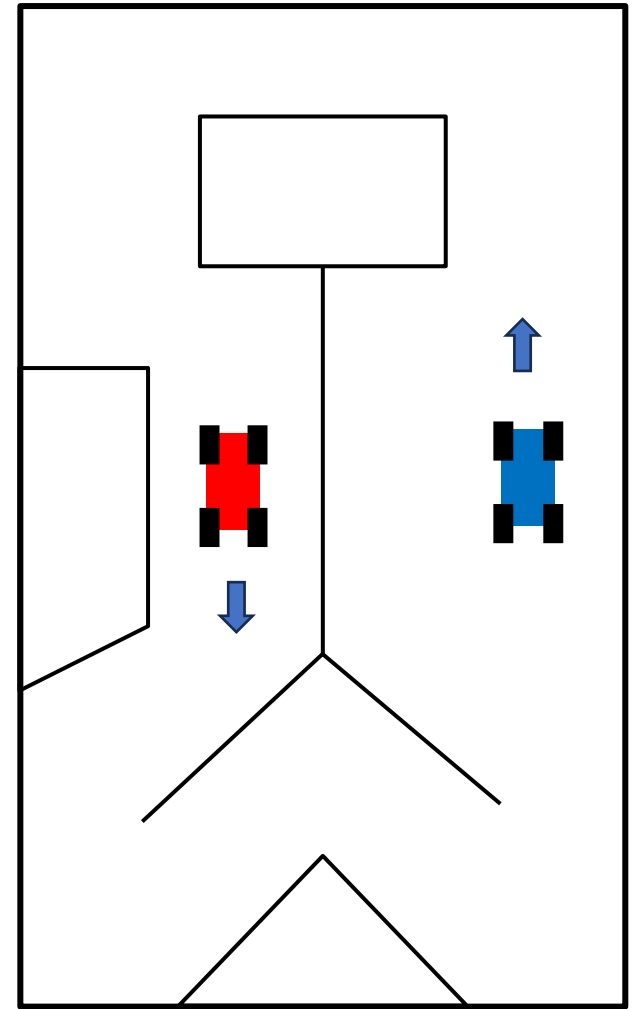
- **Collisions**

- **Track boundaries and static obstacles**

- Restore track and obstacles

- **Vehicle to vehicle**

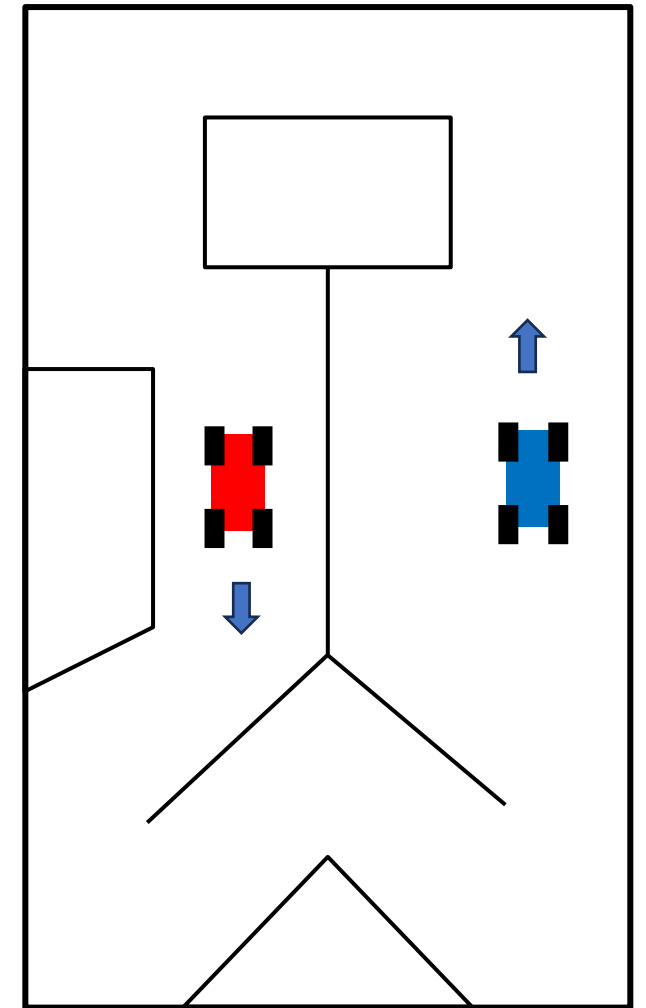
- When the victim is clearly decided by the referee, the race will be stopped if
 1. the victim car cannot continue to drive
 2. the victim car gets overtaken.



Phase 4: Head-to-Head

- **Precautions**

- **Do not stop the race without the referee's stop signal!!**
- **All computation must be performed inside the vehicle!!**
- Data must not be transmitted to vehicles during the race.
- Use the emergency stop only for permitted situations.
- No protests regarding Wi-Fi will be accepted.
- Humans are not allowed on the track
 - All hardware repair/maintenance on the track is prohibited



Rules for Head-to-Head (Warning)

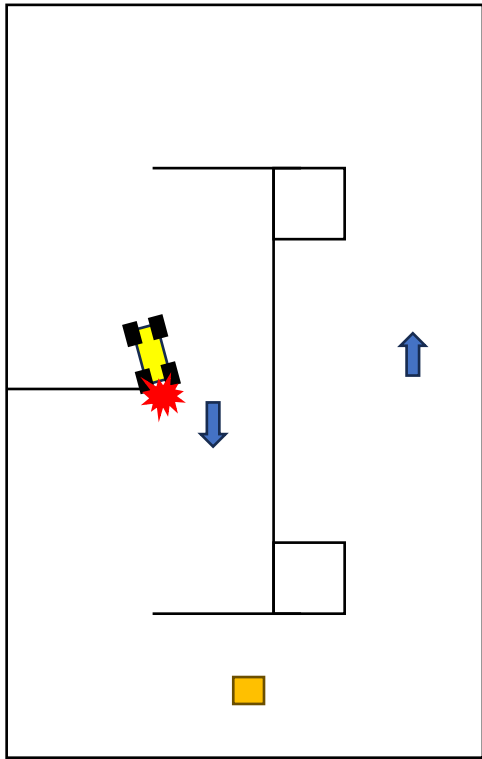
- Fault start
- Not actively restoring the track
- **Detection box not tightly fixed during the race**
- **Intervention with your own vehicle during racing**
 - Removing the vehicle outside the track after a collision
 - Directly modifying the vehicle's heading
- **A human's interference with the opponent vehicle during racing**
 - When going to fix the track and being detected by the opponent's detection module, affecting its driving

Rules for Head-to-Head (Additional lap)

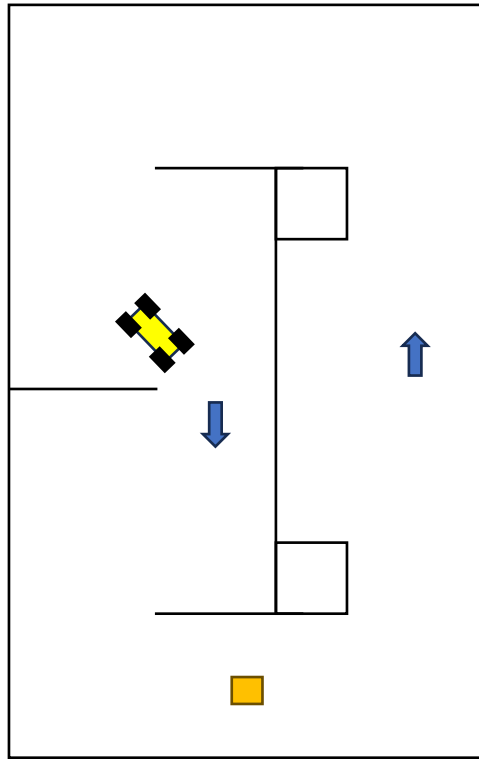
- Accumulation of 3 warnings
- A human's fatal interference with the opponent vehicle during racing
 - When going to fix the track causes physical contact with the opponent vehicle affecting its driving
- A clear offending vehicle and victim vehicle exist, and the victim vehicle becomes unable to drive
- A complete rear-end collision with a large impact
- An accident with a large impact, even if not a complete rear-end collision
- **Using keyboard, mouse or Joystick during General Racing**
 - Exception cases are same with qualifying

- **Disqualified with accumulation of 3 additional lap penalties**

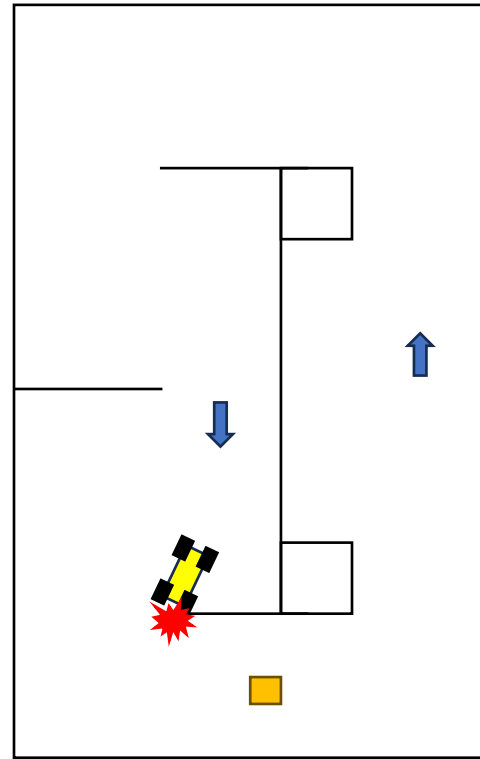
Example



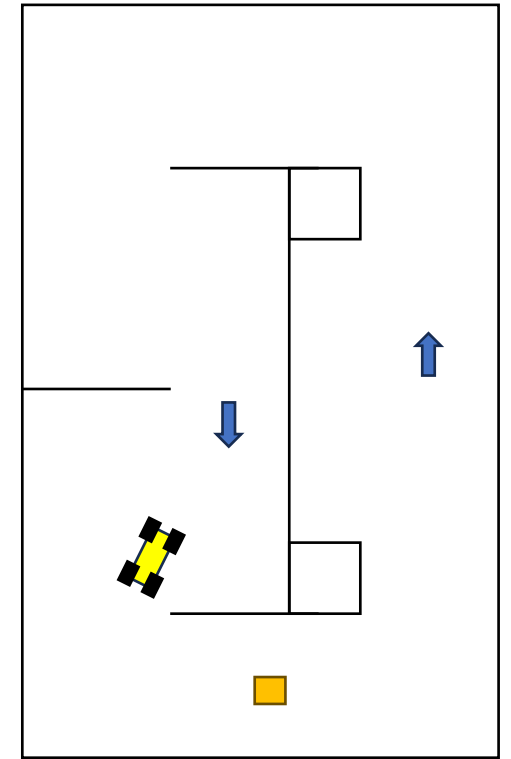
Collision



Human intervention
-> First warning

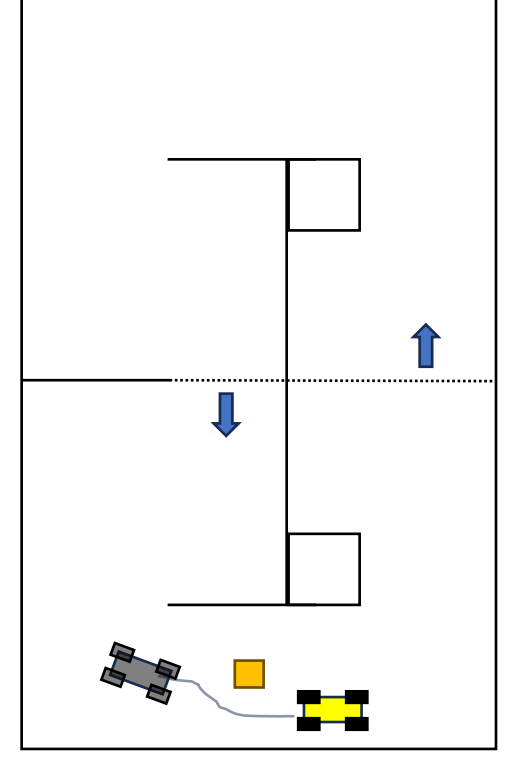
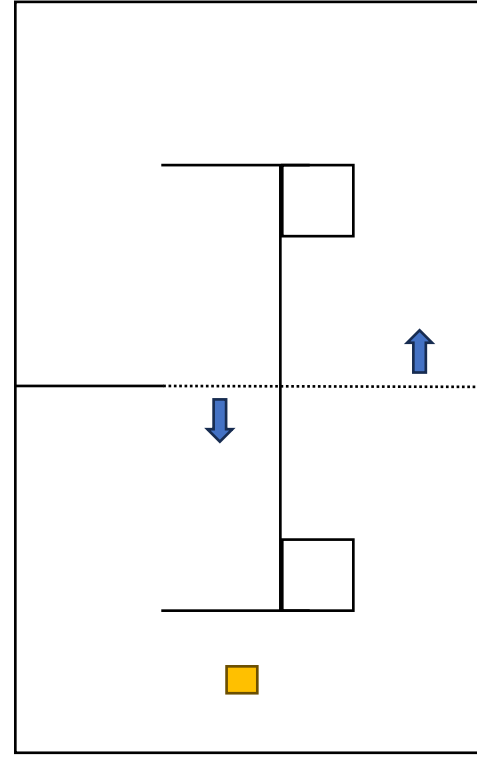
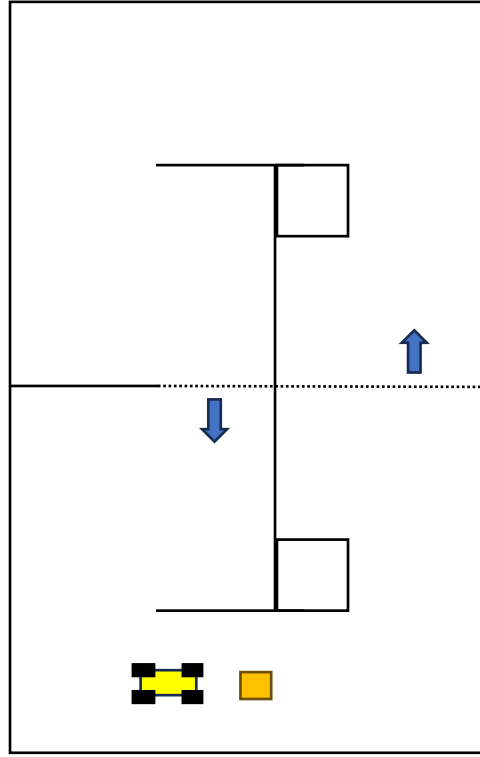
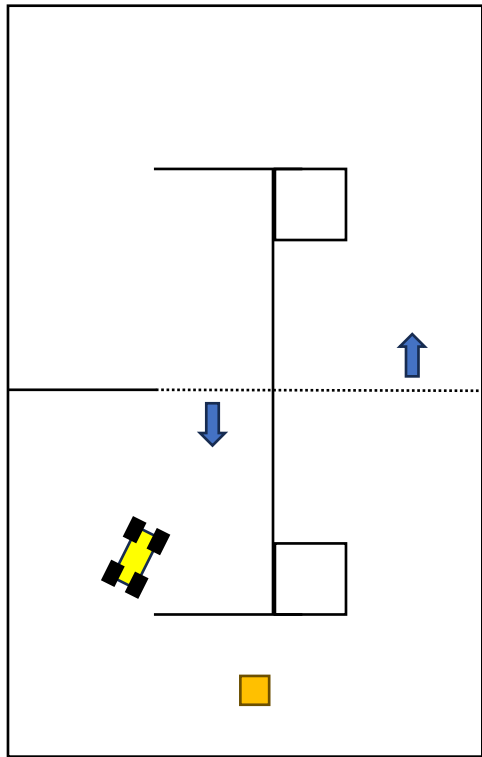


Collision



Human intervention
-> Second warning

Example

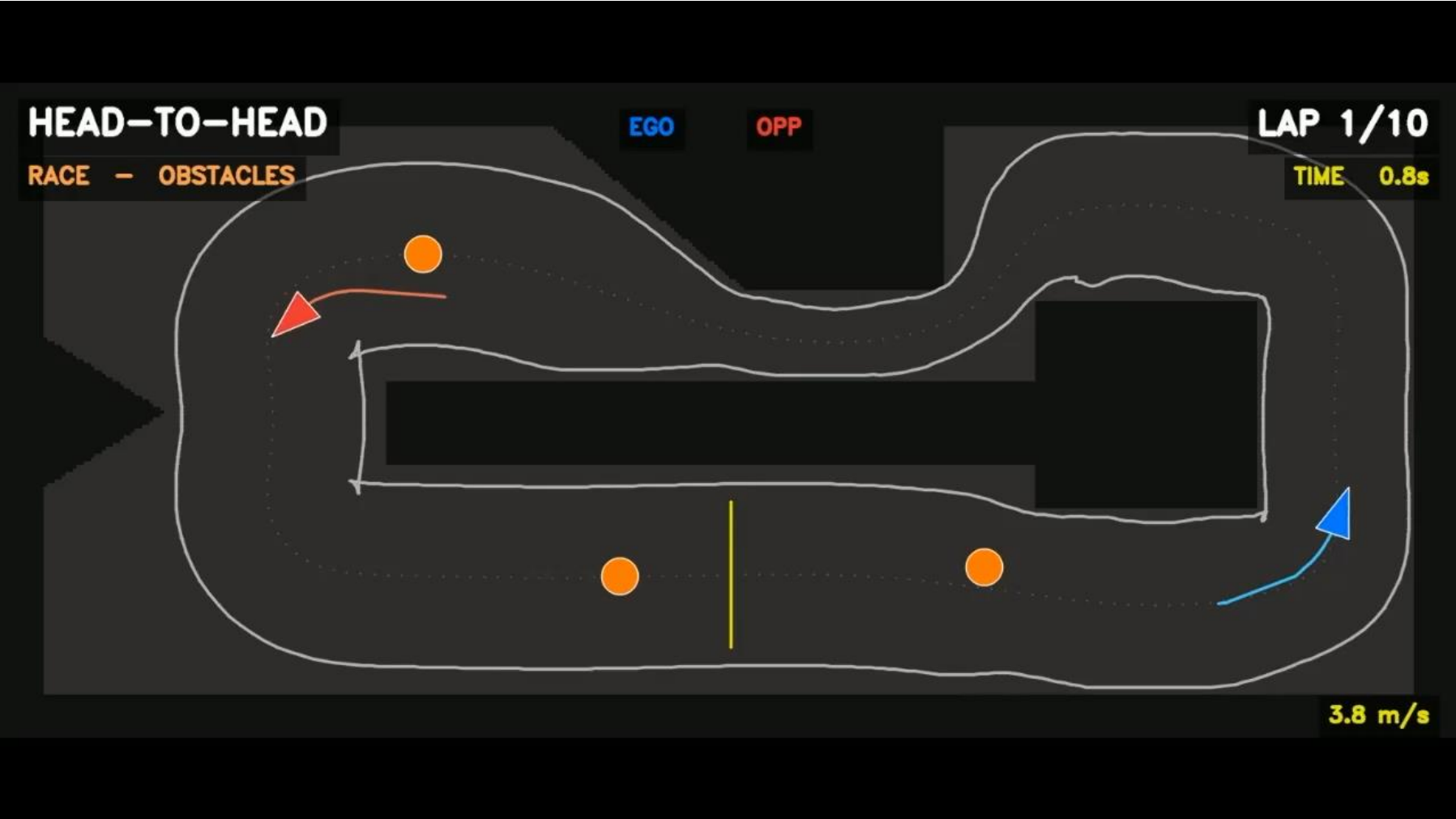


Stuck in front
of obstacle

Human intervention
-> Third warning
-> 1 lap addition

Allow slight change of
heading and moving backward

Head-to-Head Demo



QnA

Use Slack Channel(*#2026ifac-comeptition*) for additional questions!

https://join.slack.com/t/robo-racer/shared_invite/zt-40e907kle-eJeqgl3_EsWi71T5UPAVuw

