POLY MAZE

SPECIFICATION BOOK

VISION & INNOVATION CLUB

by :
The Vision &
Innovation Club

2025

SUMMARY

Notice :

Welcome to the POLYMAZE 2025 Specifications Book. In this document, you'll find all the specifications, rules, conducts as well as the rating system through the whole competition. Common parameters of the rules can change from one year to another. Accordingly, please read the rules carefully even if the chapters may seem familiar to you.

Please note that some changes or clarifications to the rules may occur throughout the entire competition period. We therefore strongly encourage all participants to regularly check the Discord server and our social media platforms for any updates.

In case of any doubts regarding the rules or robots approval, the organizing team can also be contacted via the Discordserver.

Enjoy your Reading (Riding):3

Chapter 1

Introduction

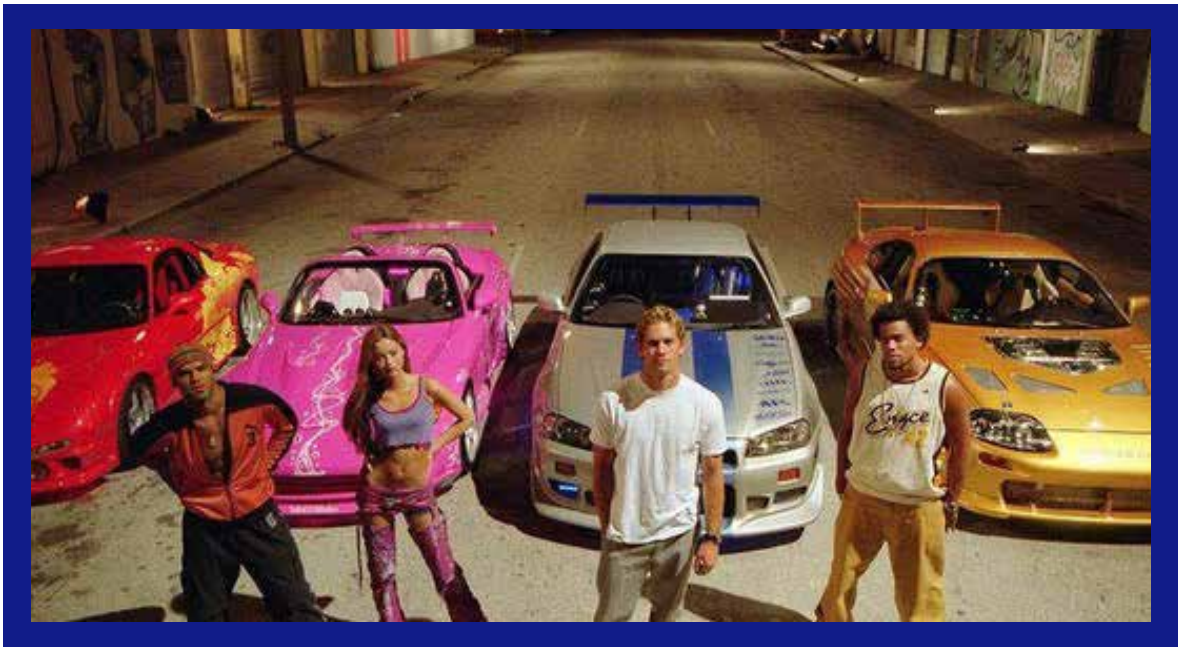
1.1 What is POLYMAZE

POLYMAZE is a competition where robots compete to solve a labyrinth. This kind of competition is very popular all around the world, including the United Kingdom, the United States, japan, Singapore, India, South Korea, and elsewhere. This year, the VIC club is organizing the fifth edition of the first maze-solving competition in Algeria.

The robot is designed to navigate the maze without any external assistance. As an autonomous entity, it must independently discover the path to solve the maze. Initially, the robot explores the maze to determine the optimal (fastest) route. Once identified, the robot proceeds to navigate this path as swiftly as possible.

To enhance the enjoyment and challenge, we've added several minigames that the robot must complete along the way. The overall winner of the competition will be determined by winning all the stages and gaining the maximum number of points in each stage. Further details are provided in Section 4.

1.2 Theme Presentation : Fast & Furious



The theme for this edition is inspired by the iconic film series “Fast & Furious”. Much like the high-speed races in the movies, our robotics competition will focus on speed, challenging participants to complete the course in the shortest time possible and outpace their rivals.

It’s a universe where every second counts; where speed, precision, and smart driving rule the streets, and the VICtory belongs to those who dare to push the limits. The story follows fearless drivers who livelife a quarter mile at a time, racing through danger with skill, style, and unstoppable determination.

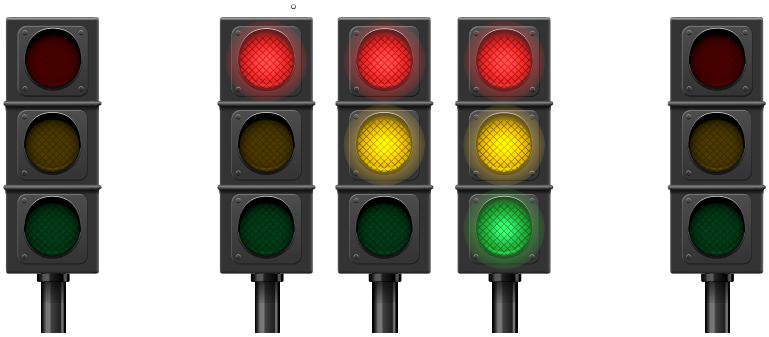
The maze represents an intense racing circuit filled with twists, turns, and challenges. Participants will design and program high-speed robots that race against time, aiming to complete the track faster than their opponents. The team that dominates the maze with the fastest, cleanest run will earn the title of Dominic Toretto of Polymaze 2025.

1.3 Main Objectives

In this edition of **POLYMAZE**, your main objective is to complete the entire maze, navigating through sharp corners and straight lines to reach the finish line in record time with minimal collisions.

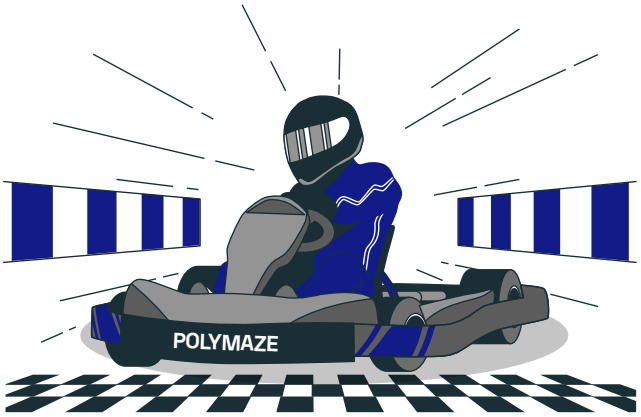
1.4 Mini Games :

LED Setup (Ready, Set, Go): Before launching into the run[1], it stays still for 3 seconds while flashing red, orange, and green LEDs, then releases them and let the race start at full throttle !



Band[2] **Detection (Checkpoints) :** Along the race course, the robot will encounter two checkpoints: one red and one green, which it must detect and respond to by activating the corresponding LED color to confirm successful detection.

Drifting Celebration : As a celebration and to hype up the crowd, the robot must perform a full 360° drift within the black square[3] at the finish line, just like a victory spin after a legendary street race.



[1] **A run** begins when the front edge of the robot crosses the starting line and ends when the front edge of the robot crosses the finish line, which is detailed in Section 4.

[2] [3] **Band & Black Square** specifications can be found in the Maze Specifications part

Chapter II

Rules & Regulations

2.1 Robot Specifications and Constraints

2.1.1 Self-Built Robots :

Only robots designed and built by the team are allowed. Maze Solvers (such as Pololu) that are sold ready-made are forbidden!

2.1.2 Self-Contained and Safe :

Robots must be **self-contained** and operate without **remote controls.**
They cannot use **combustion engines** as a power source.

2.1.3 No Dislodging Parts :

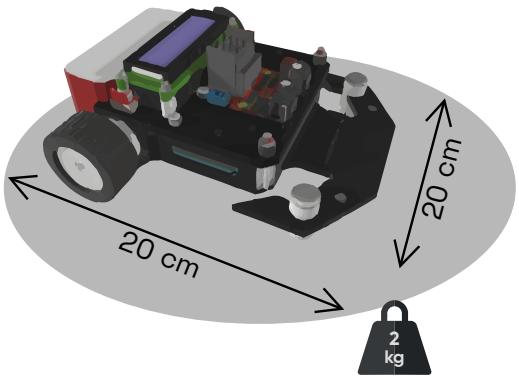
The robot must not lose **any parts** while navigating the maze.

2.1.4 Respectful Movement :

The robot must not **jump, fly, climb, scratch, cut, burn, mark,** or **damage** the maze walls.

2.1.5 Size and Weight Restrictions :

The robot's maximum length and width must not exceed **20 centimeters.**
For robots that change shape, the maximum dimensions while navigating are **20cm x 20cm** (length and width).
There is **no height restriction.**
The weight of the robot must not exceed **2 kg.**



2.1.6 Pre-Competition Inspection :

All robots will be inspected before competing to ensure they meet these specifications and pose no safety risks.

2.1.7 Disqualification for Rule Violations :

Any violation of these rules will result in immediate **disqualification** and **ineligibility** for prizes.

2.1.8 Homologation :

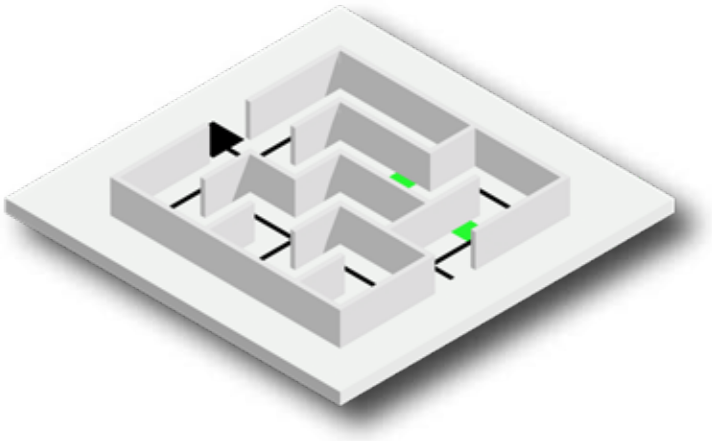
Extra points will be given to competitors for **good robot aesthetics,** the given points are detailed in the ranking system.

2.1.9 Visibility :

It is highly recommended to leave a rectangular, intact and non-deformable space of **50 x 50mm** per robot to be left on top, the teams will receive stickers printed by the organisers, which they must place in these open spaces.

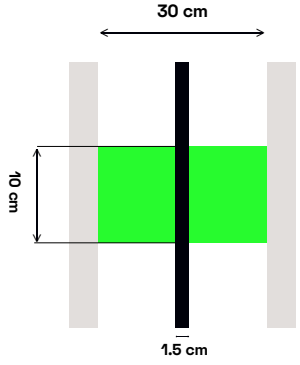
2.2 Maze Specifications

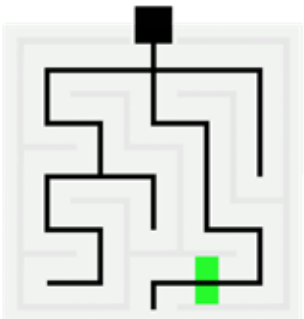
The maze consists of a large white sheet bordered by walls on all sides, except at the starting line and the finish line. It is divided into blocks, each measuring **30 cm × 30 cm**, so that the distance between two opposing walls is **30 cm.** The overall size of the maze varies depending on the competition phase; detailed specifications are provided in Section 4.



Maze Example **The schematic & dimensions may vary**

- The walls are **20cm** high.
- Black line, **1.5 cm** thick, is drawn along the paths of the maze, centered between the two opposing walls (or between all three in the case of dead ends).
- The finish line is marked by **20x20cm** black square.
- Colored bands measure **30 cm × 10 cm,** with the black line positioned directly on top of them.





2.3 Room Conditions

The room will have an ambient environment (**0-100%** humidity, non-condensing).

Do not assume specific lighting conditions at the competition site: participants **must calibrate** their robots to adapt to the environment, as lighting conditions during testing **may differ** from those during the actual run.

Participants are also reminded that **stepping** on the maze with shoes is strictly prohibited, as it may damage the surface and affect the performance of the robots.

Elements outside the maze, such as :

- Decorations, lighting, various objects
- People (including referees, teams, and spectators).

may interfere with color detection and line-following functions may interfere with color detection and line-following functions. It is strictly forbidden to request the removal or relocation of people or objects around the competition area.

Chapter III

Competition Conduct

3.1 General Definitions

3.1.1 phase

A phase is a discrete stage of the competition defined by a specific set of **maze dimensions, rules,** and **evaluation criteria,** during which each team attempts to **optimize performance** under those constraints.

POLYMAZE consists of **5 phases :**

Detailed rules and descriptions for each phase are provided in further sections.

3.1.2 Matches & Rounds

A **match** is a **1vs1** duel between two teams in a specific maze. **Matches** are held exclusively in the last two phases (group stage and finals). The outcome of each match is evaluated according to the specific rules of the corresponding phase, with the winner receiving the appropriate reward or progression.
A **round** is a unit of play within a match that occurs only when the **match** format extends beyond a single game. In each **round,** the two teams compete against each other, and the **match** continues through successive **rounds** until one team reaches the required number of wins to **conclude the match.**

3.1.3 Turns

A **turn** is the period allocated to a team to access and navigate the maze. The duration of a **turn** varies by phase, but all teams are given equal time during their respective **turns**. This time includes both adjustments between **runs** and **reprogramming**. All **successful runs** are recorded, and the best **run** within **the turn** is considered the team's official score.

3.1.4 Runs

A **run** starts as soon as the front edge of the robot crosses the starting line and stops when it crosses the finish line.
It does not include the starting minigame (**Ready, Set, Go**) or the finishing minigame (**Drifting**).

- Each exit from the starting square initiates a new **run**.
- **No time is recorded** if the destination square is not reached.
- Re-entering the starting square before reaching the destination **aborts the run.**
- Time spent navigating after reaching the destination **does not count towards a run.**
- The robot may explore the maze freely without any operator intervention.

3.2 General Competition Rules

3.2.1 Stopping/Removing the Robot

- Multiple runs **are allowed** within the given time limit (except for the Semi-Finals & Finals).
- Teams may **abort runs** and **return the robot** to the starting square.
- Once a run has started in their designated maze, participants are **not allowed** to physically touch or interact with their robot as long as any other team is also racing in the same maze.

3.2.2 Modifying/Reprogramming the Robot

- Participants **are allowed** to reprogram their robots during the runs, but the time spent on reprogramming is included in the overall turn time (this does not apply to the **Semi-Finals** and **Finals**, as detailed in the next sections).

- Feeding information about the maze to the robot is prohibited. The robot **must navigate** the maze **independently** and **automatically** select the most suitable path.

- The following modifications are allowed :
  - Changing switch settings (e.g., selecting algorithms)
  - Replacing batteries
  - Adjusting sensors
  - Changing speed settings
  - Making repairs

3.2.3 Changing the Robot's Composition

❌ Altering the robot's weight after the time starts is **not allowed** (e.g., removing sensors or switching batteries to gain speed).

✔ Judges will arbitrate all interactions with the robot.

3.3 Pre-Competition Conduct

3.3.1 Registration Follow-Up and Team Validation

After being initially **accepted** through the registration form, participants are invited to join the official **POLYMAZE Discord server**, where they may freely communicate with the organizers and ask questions throughout the **pre-competition period.**

Each team is assigned a private channel where they must regularly present the progress of their robot directly to their designated supervisor. Progress updates can be submitted in the form of **photos** or **videos** showcasing the development stages.

Final acceptance into the competition depends on the team showing **enough progress** in building their robot

Accepted teams will be notified before D-Day and must be present for the first phase of the competition

3.3.2 Team Members Adding/Removal/Replacement

Teams are permitted to **add, remove,** or **replace** members within a **timeframe** specified by the organizing team, as communicated via the official Discord server.

A dedicated form will be provided for teams to submit any requests to modify their team composition.

3.3.3 Homologation

On the first day, the organizing team will **check the eligibility** of each team. If one or more conditions (on the participants or their robot) are not fulfilled, the team concerned will be **disqualified.**

During this homologation, **bonus points** will be awarded to each robot if certain criteria are met. These details are explained in the rating system.

3.3.4 Warm-Up Phase

Each team is allowed to explore the maze assigned to it during the warm-up phase. Every team will have access to **the test mazes** prepared by the organisers to experiment with. During this phase, teams can freely **set up, maintain,** or **move** their robots within their assigned maze.

No score will be given for the warm-up phase, which will not count towards the final competition score. The purpose of the warm-up phase is to allow teams to familiarize themselves with the maze and fine-tune their robot's performance.

3.4 First Phase : League Phase

3.4.1 Phase Description

The labyrinths will be assigned to the teams **randomly,** all labyrinths are **identical.**

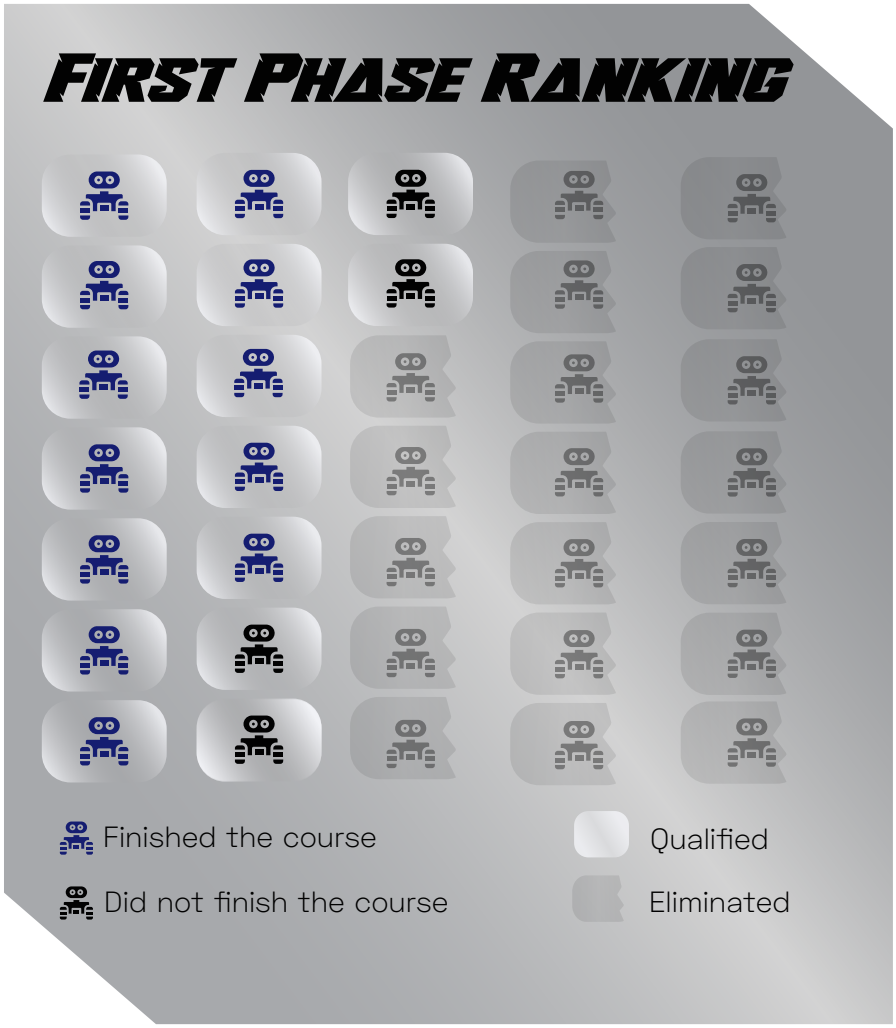
Each team will have **two turns,** with each turn lasting **5 minutes.** During each turn, teams may attempt the maze multiple times, and their **best run** will be **counted** toward their final score.

Competition Conduct

Teams will be ranked, regardless of the group/labyrinth they were in, as follows :

- Teams that have **solved** the labyrinth have **priority** and are ranked among themselves. Teams that have **not solved** the labyrinth will be ranked according to the number of points obtained.
- The ranking system is divided into **two categories:** one for those who **completed** the labyrinth and one for those who did **not complete** it in less than **5 minutes.**

The ranking will be shown on the **scoreboard** after this phase and will be shared with the participants, the top **16 teams** will advance to the next phase.



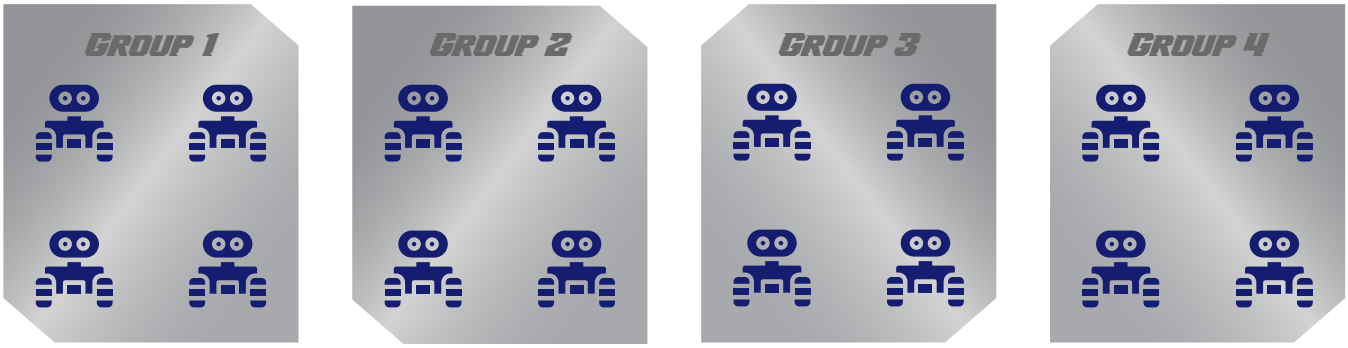
3.4.2 Phase Specifications

- Maze size: **5 x 5 blocks, identical** for all participants.
- **2 turns** of **5 mins**, multiple runs and modifications within the time limit and the supervision of the judges.
- Minigames : **Included.**
- Homologation points : **Counted.**

3.5 Second Phase : Group Stage

3.5.1 Phase Description

In this phase, participants who have advanced from the initial phase are divided into **four groups.** Within each group, teams engage in a **round-robin format,** where every team competes against each other once



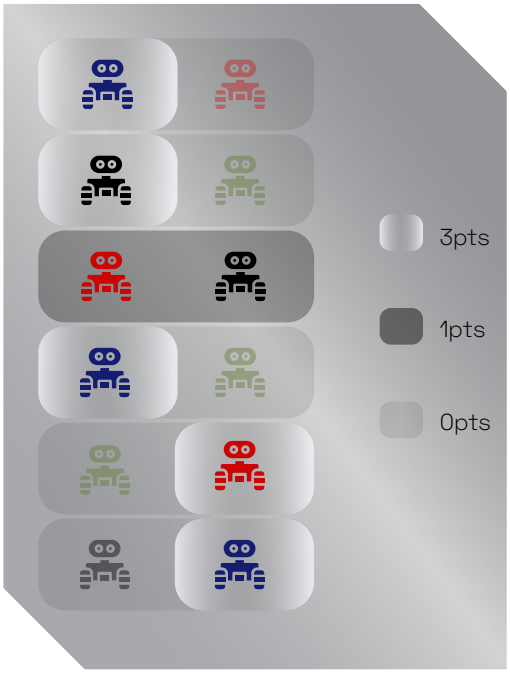
Each team will play an **equal** number of **matches** across various mazes. Each match takes place in **a different maze.**

Teams will only have **one turn** of **5 minutes** each match. The teams can make multiple runs during each **5 minute turn**, and **their best run** will be considered in their **final score** in the match.

Competition Conduct

Teams are awarded group points based on match outcomes :

- **Three** points for a **win.**
- **One** point for a **draw.**
- **Zero** points for a **loss.**



At the conclusion of the group stage, teams are ranked within their respective groups based on their **accumulated points.** In the event of **tied group** point totals, a series of **tiebreakers** are employed, considering the following criteria:

- Number of **completed** mazes.
- Accumulated match points for **completing** the maze.
- Accumulated match points for **not completing** the maze.

Advancement to the next stage is reserved for **the top two** teams from each group.

	PTS	CMP	SUCC	UNSUCC
	9	3	1200	0
	4	2	680	120
	4	2	645	145
	0	1	120	750

3.5.2 Phase Specifications

- Maze size : **6 x 6 blocks**, a **different** maze for each match.
- One turn of **5 mins** for each team in each match, multiple runs and modifications within the time limit and the supervision of the judges.
- Minigames : **Included.**
- Homologation points : **Not considered.**

3.6 Semi-Finals

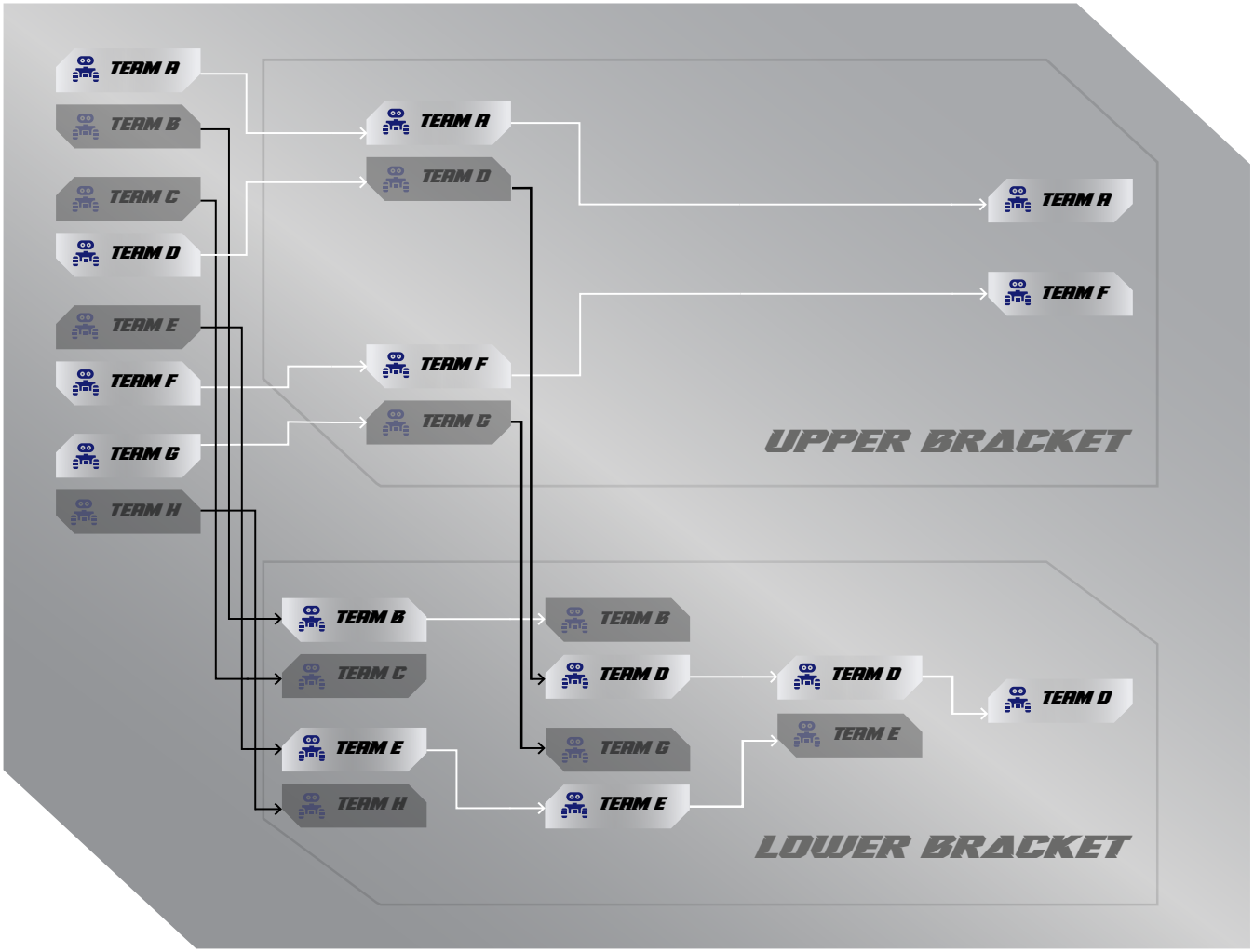
3.6.1 Phase Description

The Finals phase is the concluding stage of the competition and follows a **double-elimination bracket** format. It features the **top 8** teams that advanced from the **Group Stage**.

Initial matchups are seeded such that teams ranked **first** in their respective groups are **paired** against those ranked **second.** Each team remains in the competition until it has accumulated **two losses,** as follows:

- Winners of each match advance through the **upper bracket.**
- Losers are transferred to the **lower bracket**, where they must win successive elimination matches to remain in the tournament.
- A team is eliminated upon losing once in each bracket.

Competition Conduct



Semi-Finals bracket

All matches in this phase are conducted in a **Best-of-1** format in a **7 x 7 maze,** with the exception of **the Final Games,** the structure of which is detailed separately.

The primary criterion for determining the winner of a match is the time taken to complete the maze, with lower time being favorable.

In the event of a tie in completion time, a secondary criterion is applied :the team with fewer wall collisions is declared the winner.

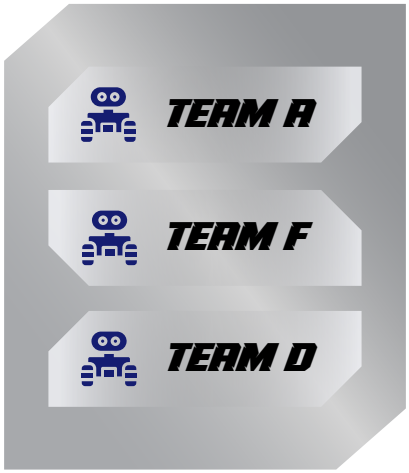
3.6.2 Phase Specifications

- Maze size: **7 x 7 blocks**, different maze when winning a match.
- One turn of **5 mins** for each team in each match, **three runs** and **two modifications** within the time limit and the supervision of the judges.
- Minigames : **Not Included.**
- Homologation points : **Not counted.**
- Manual intervention by **touching** the robot is not permitted at any time during the run, in case of a malfunction regarding the robot being unable to move, the run is considered **immediately aborted.**
- No time penalties are applied for wall contact, except in cases where the robot causes **damage to the maze**, which results in immediate abortion of the run..

3.7 Finals

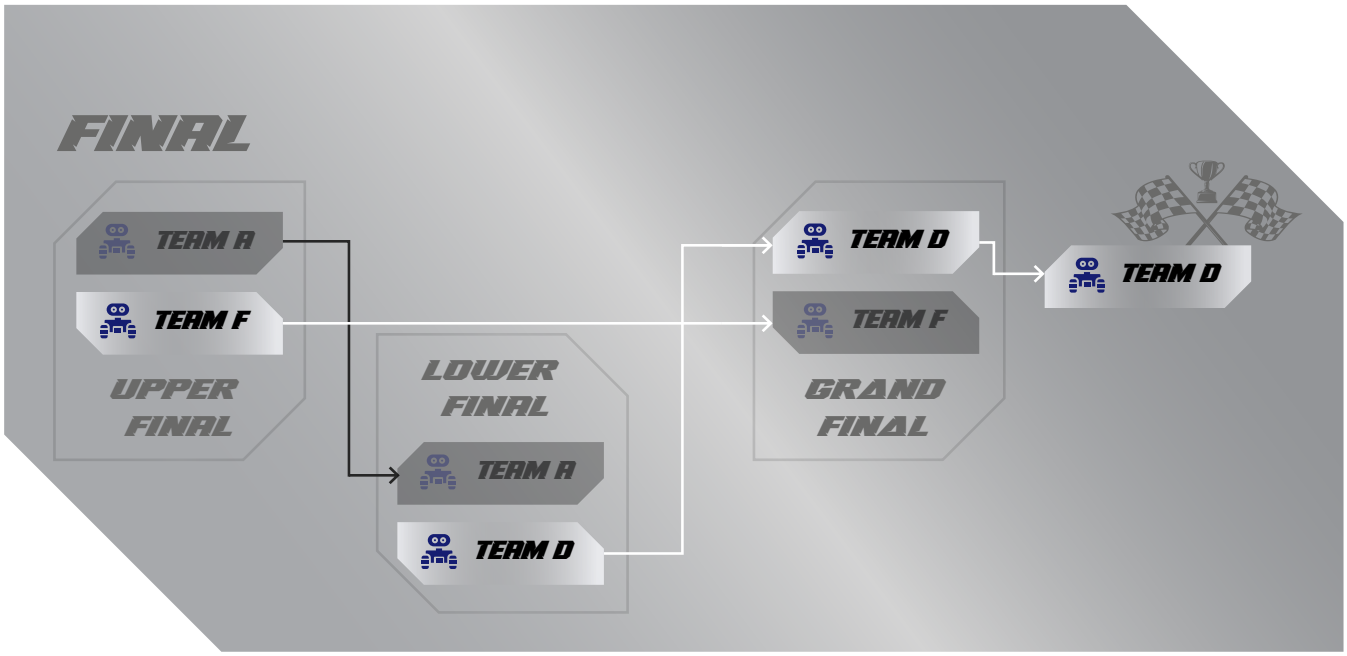
3.7.1 Phase Description

The Grand Final is the final stage of the POLYMAZE competition, determining the overall winner among the three remaining teams. Two teams advance to the Finals from the upper bracket, and one team advances from the lower bracket.



Competition Conduct

This stage consists of three matches :



Final bracket

grand final:

- Matches in the grand final are conducted in a Best-of-5 format.
-The first team to win three rounds is declared the overall winner.
- The first team to win three rounds is declared the overall winne.
- No reboot match is held if the team emerging from the upper bracket is defeated.

3.7.2 Phase Specifications

- Maze size: **9x9 blocks,** in the Upper final and the lower Final, and **11 x 11 blocks**, in the Grand Final
- One turn of **5 mins** (**7 mins in the Grand Final**) for each team in each match (or round), maximum of **three runs** and **two modifications are allowed** within the time limit and the supervision of the judges.
- Minigames: **Not included.**
- Homologation points: **Not counted**
- Manual intervention by touching the robot is not permitted at any time during the run. In case of a malfunction regarding the robot unable to move, the run is considered immediately **aborted.**
- No time penalties are applied for wall contact, except in cases where the robot causes **damage to the maze,** which results in immediate abortion of the run.

Chapter IV

Appendix

4.1 Rating system

4.1.1 Mini games

The minigames are considered for only the League Phase & the Group Stage

Ready, Set, Go : 4 points (1 point for red, 1 for orange, 1 for green, 1 for starts on time and the LEDs turning off before the robot starts)

Checkpoints : 2 points per successful checkpoint

Drifting Celebration : 4 points (half the points if performed outside the black square at the finish line)

4.1.2 Homologation

This points are counted as bonus points for only the League Phase

- Respecting the theme in robot aesthetically: 1 point
- Cable management / PCB : 2 point

4.1.3 Penalties

The penalties are considered for only the League Phase & the Group Stage

- **Hands :** Penalties are subtracted when the competitor touches the robot to help it when it is blocked (7 points for each adjustment, max of **3 touches** are allowed before restarting the whole maze).

Touching of robots is **allowed** only when the robot is **stuck** for a considerable amount of time.

Walls : Every time the robot hits a wall, a 3 points penalty will be taken

4.1.4 Points Calculation for the First day

- If the robot has completed the maze:

Total points = **(300 - time consumed)** + **bonus** - **penalties**

Each competitor has 300 seconds to solve the maze. Once completed, the consumed time in seconds will be subtracted from the total score.

- If the robot has not completed the maze within 5 minutes :

Total points = **(distance covered)** + **bonus** - **penalties**

The distance covered will be calculated by the number of blocks covered on the shortest path.

POLY MAZE