SRI LANKAN ROBOTICS CHALLENGE 2026

TECHNICAL SPECIFICATIONS

SCHOOL CATEGORY

CONTENT

CHAPTER 1
INTRODUCTION

The field of Robotics has acquired much interest for the past two decades and with the breakthroughs in the field of AI and sensor technologies, it has gained unprecedented traction in the present day. The Electronic Club of the University of Moratuwa and the Department of Electronic & Telecommunication Engineering initiated the 1st Sri Lankan Robotics Challenge (SLRC) in 2012 and continued its legacy for 12 consecutive years making it one of the longest running and pioneering Robotics festivals organized in Sri Lanka, this year being the 13th iteration.

The goal of the SLRC is to bring together all robotics enthusiasts from all over the country and provide them with a platform to showcase their skills in a competitive arena. In the School Category, the primary focus is to spark school students' interest in robotics while fostering their creativity and problem-solving abilities, encouraging them to apply these skills to real-world challenges in the field.

Your task will be to build a robot capable of completing the specified challenges while adhering to the guidelines outlined in this document. The competition will include tasks including line following, object detection and picking, uneven terrain traversal and magnet detection. This year too we are excited to introduce the Hidden Task with spot-on coding. Winners will be entitled to valuable cash prizes and certificates awarded by the University of Moratuwa. This is a call to all school students eager for a challenge! Seize this opportunity to showcase your technological skills to a nationwide audience and make your mark!

"READY ? CAUSE THERE'S NO GOING BACK."

The very own words of Kevin Flynn, a mastermind computer programmer who is the developer of "TRON", an arcade game for ENCOM, one of the largest video gaming companies in the latter part of the 20th century. After his mystic appearance in 2010 the two rival companies ENCOM and Dillinger Systems went head-to-head with competition and technological advancement

ENCOM. under the leadership of the successors of Flynn and Dillinger Systems, under the Dillinger family, are both in hard belief that before Flynn disappeared, he was about to discover a major breakthrough in the field of AI and the barrier between the physical world and "The Grid" in the digital world of his construct in TRON.

After hard and numerous research both were able to bring to reality what was digitally constructed but were constrained by the "29-minute" life barrier. Hence all what was brought to the real world from the digital world "de-resolutioned" after 29 minutes of existence.

Meanwhile when Eve Kim of ENCOM were in pursuit of Flynn's breakthrough, Julian Dillinger who is currently leading Dillinger Systems manages to construct "The perfect indispensable soldier, Ares" a master control program for the security of the digital constructs of TRON.

Thus, it is up to you to decide whether the solution to the "29-minute" barrier, "The permanence code" is found by ENCOM or Dillinger. Both Kim and Julian are waiting to guide you in their own digital worlds, but are you courageous enough to take on the mission on your own light-vehicle?
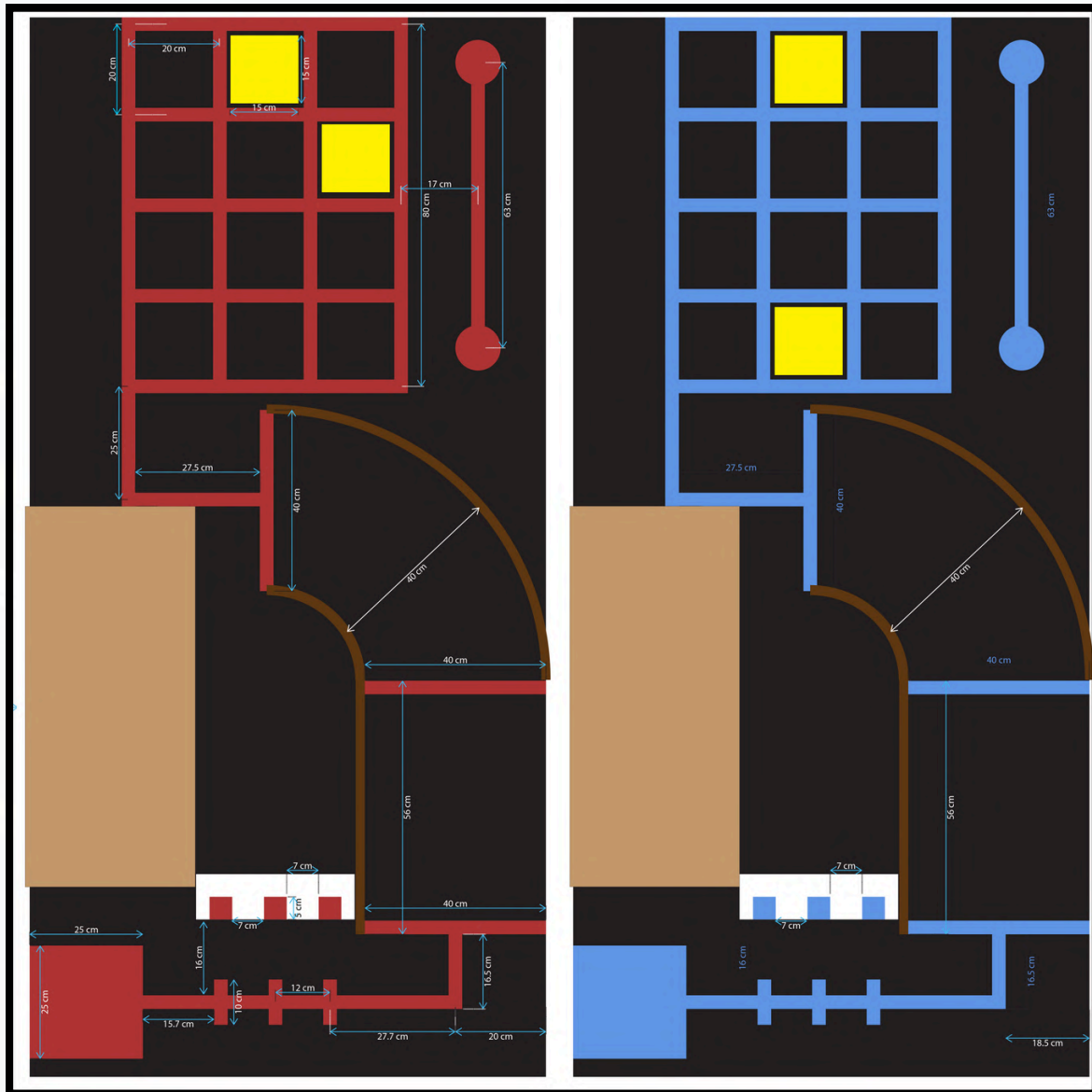
ARENA SPECIFICATIONS

Figure 1: ARENA SPECIFICATIONS

ARENA 3D VIEW

Link to 3D view

https://bit.ly/SLRC-Sch-Arena

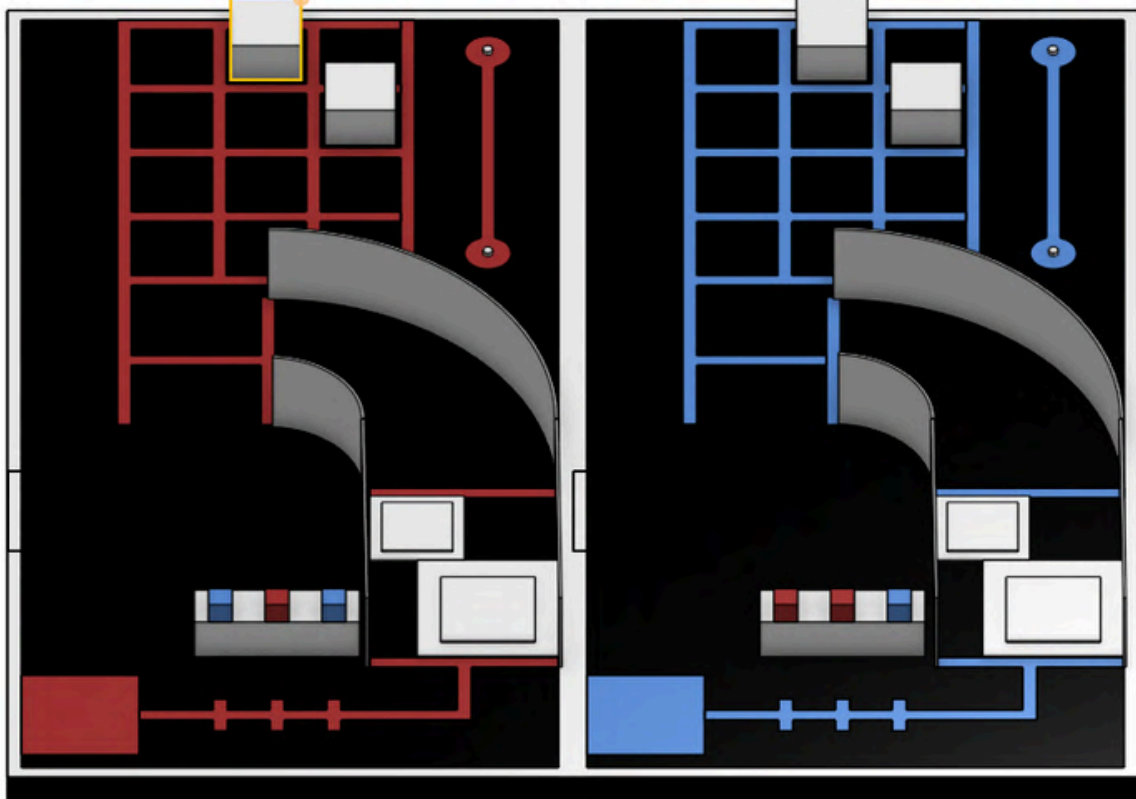View the SLRC University task 3D arena Onshape document to go through the dimensions and drawings of the Arena.

Figure 2: 3D ARENA SPECIFICATIONS

TASK DESCRIPTION

This year's challenge for young robotic enthusiasts can be mainly broken down into 6 tasks.

1. Colour line following and box picking.
2. Uneven terrain traversal.
3. Wall following.
4. Hidden task.
5. Object avoiding.
6. Magnet detection.

Task 1 (Identity initialization)

When starting you would sense whether you are in the Dillinger digital world (Red arena) or in the ENCOM digital environment (Blue arena) and upon the sensation you would have to traverse through the paths while tackling the foes. At first you need to grab your "Identity disc" (box of corresponding colour) which is the key to your existence in the digital world.

Boxes will be placed on an elevated stage of height 10cm (check fig 4) as shown in the diagram. There would be lines placed perpendicular to the line of navigation in front of each box such that it would create 3 junctions.
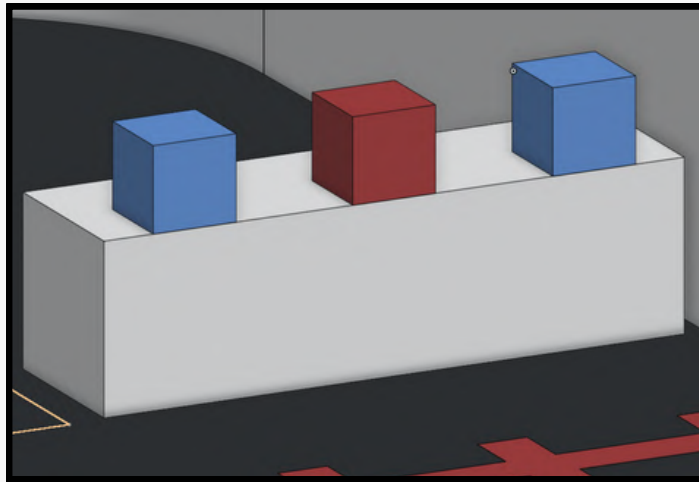
The correct box which should be picked will be mentioned, and there should be a pre-defined button/switch arrangement so that the player can select before placing the robot on the arena for a particular round.

(eg: If a player sets up a 3-switch arrangement, when it is mentioned that the robot should pick box 2 as shown below in Fig 3 , the player can set it to switch 2)

Figure 3: Task 1 arena

After having the correct sensation of colour your light-vehicle need to navigate along the line of corresponding colour (Red if you are on the red arena/ Blue if you are on the blue arena).

Figure 4: Task 1 elevated stage

Task 2 (Adaptation)

After you gather your "Identity disc" you are all set to travel in your light-vehicle, but since you just came into the digital world your body needs adjusting. Hence you would experience a jolting, uneasy experience where your light-vehicle would tend to travel unevenly.
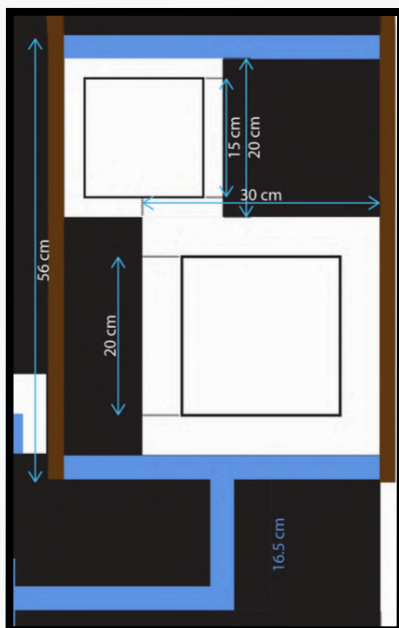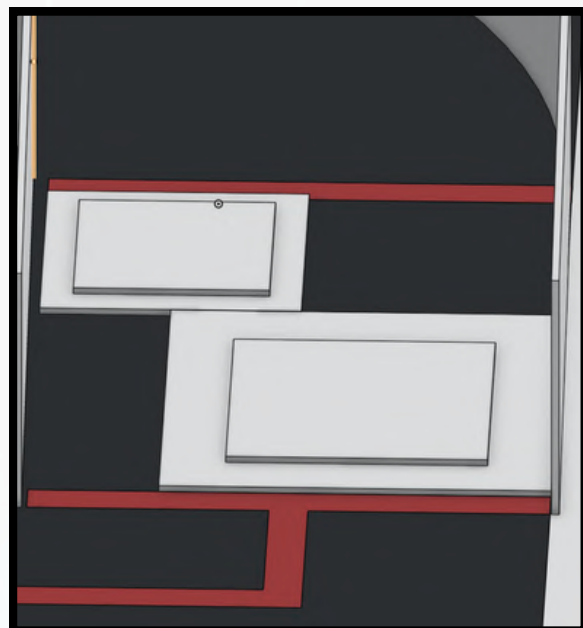

Figure 5: Task 2-2D view

Figure 6: Task 2-3D view

- Hence the uneven terrain ! After entering the uneven terrain, the light-vehicle need to be straight as possible and find the end of the terrain.

- The uneven terrain would be formed with foam board (KT board) squares of about 0.5 cm thickness each having side length 20 cm, 15 cm and 30 cm stacked on top of each other. (Check Fig 5 and Fig 6)

Task 3 (The Guided Chambers)

After reaching this point, the leader of the establishment of your world is ready to guide you through the peril for a brief period of time.
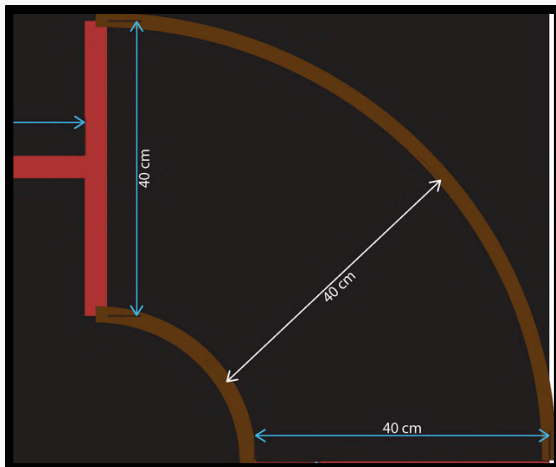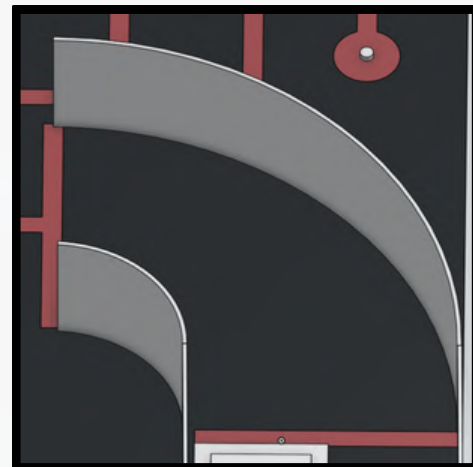

Figure 7: Task 3 -2D view

Figure 8: Task 3-3D view

They have constructed walls (height 20cm and thickness 2cm) so your light-vehicle can take that as a guide and travel by following the wall. The walls are constructed with a curvature such that there is clearance of 40cm (or more) so that the robot can travel safely.

Task 4 (The Permanence Code) - Hidden Task

While there is guidance there is a brief communication loss and hence your guidance is lost. After following the wall and the coloured line, you are on your own. Thus begins the hidden task!

At this point you realize that the permanence code should be closer and must navigate your light-vehicle in order to take "The Permanence Code" to your possession.

NOTE: This task can be done by the hardware already installed to perform other tasks and hence does not require any additional hardware or methods of navigation.
After you possess the permanence code, now you must hurry to the gateway to go back into the real world.

Task 5 (The Grid)

After entering "The Grid" you feel that you are no longer alone. Soldiers from the enemy camp have been deployed to slow you down and take "The Permanence Code" from you. You must cautiously dodge them on your way to reach the gateway.

All enemy camp soldiers are boxes with dimensions 15x15x10 cm as illustrated. After avoiding your enemies you would reach a coloured line, and would have to navigate your light-vehicle to reach the junction to turn to "The Gateway"
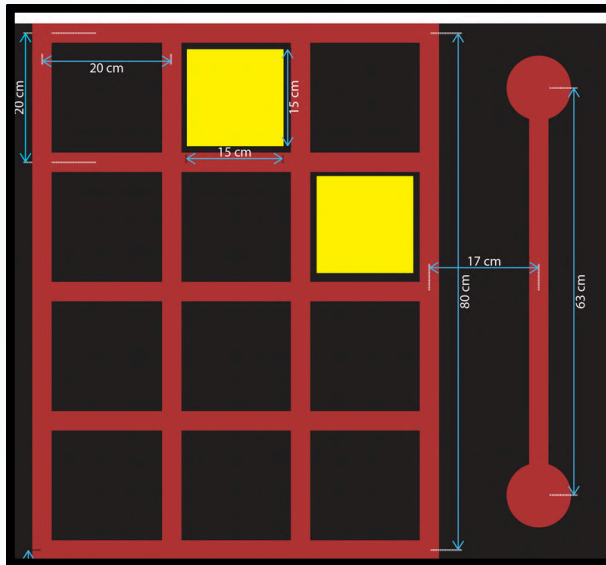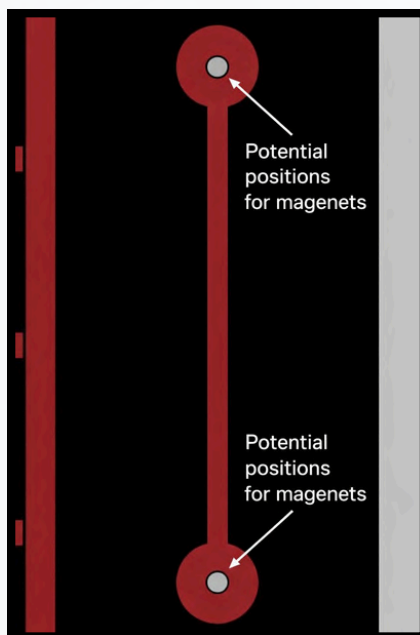
Figure 9: Task 5 arena

NOTE : Please note that the obstacles will be placed such that there will always be a line with no obstacles on the square on either side of the interested line.

Task 6 (The Gateway)

Figure 10: Task 6 arena

NOTE: On spots with no magnets, structures of similar dimensions will be placed.

At reaching The Gateway another challenge awaits you. For maximum security Flynn has decided two identical gateways. Only a true soldier would be able to identify the proper gateway.

As illustrated from the two circular spots, there would be a magnet stack (Three Neodymium magnets of 20mm in diameter and 3mm each in height) on the circular spots on the coloured lines. Since **there can be magnets on both spots** as well, it is **mandatory for the robot to search both spots even after finding the magnet in one spot** and indicate the magnet detection appropriately (eg: Lighting an LED).

CHAPTER 5
ROBOT SPECIFICATIONS

- The robot's dimensions **must not exceed 25 cm x 25 cm** (width x length) at the start of the competition, and this will be verified before the first round by placing the robot inside a 25 cm x 25 cm box.

- During operation, extensions that temporarily exceed the initial size constraints are allowed to be deployed; however, these extensions must retract to remain within the given dimensions when the robot starts at the starting square. There are no limitations on the robot's height.

- The robot should be completely autonomous. Any remote control would lead to the disqualification of the robot.

- The robot should be powered with an internal power supply with a **supply voltage not exceeding 24V**. The final unit, including the power source, should be within the dimensions specified above.

- Robot must be built entirely by the team members. Therefore, **no off-the-shelf Lego kits or assemblies are allowed** except for the readymade processing boards, sensor modules, drive gears, arm/gripper, and other electronic modules.

- The robot should not cause any damage to the platform (arena). Any damage to the arena leads to disqualification. If the judges feel that a robot has a high risk of damaging the arena, they can deny the attempt.

- The robot should be activated using a single start switch placed on the robot itself. Therefore, the robot should have a simple starting procedure.

- The starting procedure of the robot should not involve giving the robot any manual force or impulse in any direction.
- The robot should be able to operate under provided lighting conditions. The robot cannot transform into two robots during gameplay.
- The **minimum distance** between the **middle of the lines and the edges of the arena will be 15 cm**.
- The robot should be designed such that it won't fall out of the arena. The robot should not leave any of its components behind in the rest of the arena

CHAPTER 6
RULES AND REGULATIONS

General

- There won't be any arena changes once a round has started. All teams will compete in the same arena with an identical layout, except for position of boxes in task 1, obstacles in task 5 and magnets in task 6.

- All the teams **must submit their robots to the organizers 15 minutes before the start** of the elimination round and the first round. After that, the robot will be given to the relevant teams only for their attempts at the game

- The contestants must be prepared to start within 5 minutes after the call; if not, the attempt is lost

- Each team **must designate one member responsible for programming the robot for the hidden task**. After the hidden task is revealed, the appointed member must report within five minutes, as the hidden task programming session will commence simultaneously for all teams.

- During this session, the designated member is **strictly prohibited from seeking external assistance**, whether in person or via any messaging platforms. While contestants are permitted to browse the internet, the **use of AI chatbots or Large Language Models (LLMs) is strictly forbidden**. The organizers will closely monitor all participants, and any violation of these rules will result in immediate disqualification from the competition.

- A team should place the robot entirely inside its starting square at the start of its run. When the judges give the signal, the robot can be switched on. From then on, the robot should navigate autonomously. The contestants should not manually alter the orientation of the robot during the gameplay. Additionally, the contestants should not communicate with or control the robot during an attempt.

- Program or hardware modifications (battery swapping can be allowed) of the robot are not allowed within the 15-minute compete time.

- The **time** taken to travel from the **start square to the second circular spot in task 6** is called the **total run time**. Separate clocks for both teams will start when the judges give the signal to start. The clock will stop when the robot reach the end and indicate the identification of the magnet.

- If the robot drifts out of the line to the extent that no part is on top of the line in line following segments, the judges will consider it as jumping out of line. However, if the robot finds its way back to the line by itself: it can continue, provided that the distance skipped by the robot along the line is less than 30 cm. The judges may deduct points in this case. If the robot does not find its way back to the line within a skipped distance of 30 cm, which would be considered the end of that attempt, you will be allowed to remove the robot from the arena.

Calibration

- Both teams will get access to the line starting from their respective starting square to the first junction which leads to the uneven terrain.

- Calibration time will be only 2 minutes for both teams and teams can use this time to **calibrate to the coloured line (red/blue)** and **set the switch/button arrangement** on which box to pick.

- Calibrations can only be done through external adjustments of the robot. Therefore, program changes or hardware part replacements are not allowed.

- If a team fails to finish calibrating within these **2 minutes**, they will be **penalized with 20 marks** and **will be given another 5 minutes**. But if a team fails to complete the calibrations and move onto the game they will be disqualified.

Team composition and Eligibility.

- A team can have a **maximum of 5 members and a minimum of 1 member**. Students from different schools can form a team, but the team should register under one school name.
- Each team member should be **20 years or below** to be eligible to compete, and a student can only represent one team.
- All members of the team should be attending school or after A/Ls but should not be selected to attend nor registered at a university at the time of their participation in the competition.
- All the team members should have a valid document to prove their eligibility to participate in the competition.
- Multiple teams could compete, representing the same school, but one team can only submit one robot.
- Violation of the above conditions would lead to disqualification

Marking criteria

- At the **start** both players are offered with **100 points** to start and marks will be penalized or granted as per the following rules.
- For picking the box in Task 1 the player will be granted with **30 points**.
- If the robot hits the walls while traversing in Task 3 there would be a **maximum penalty of 10 points**.
- The exact allocation of marks to the hidden task would be revealed on competition day, where as a **penalty** of **40** will be there for **skipping the hidden task** and a **maximum of 50 marks** for **completing the hidden task**.
- While traversing in the grid in Task 5, if the robot **hits any obstacle** there would be a **penalty of 10 points** per obstacle-hit.
- In the final task if the robot successfully **indicates the magnet presence/absence**, **10 points** would be offered per each identification.
- After inspection, the judges have complete freedom to award marks under three categories:
  - Line following - Up to **30 points**.
  - Wall following - Up to **30 points**.
  - Program structure and style - Up to **20 points**.
- The player **reaching the end first** would receive marks based on the **time gap** as shown in Table 1.
- Eg: Say Player A and B compete in the race. Then if player A reaches the end prior to player B with a 25 s time gap, player A would be rewarded with 75 marks.

Time Gap (Seconds)	Marks
0 - 5	40
5 - 10	55
10 - 20	65
20+	75

Table 1: Time Gap Marks

FIXTURES

- Elimination round will take place with each player having to perform in the **first three tasks** (this **will not take a race-format**, however marks will be awarded in the same format).
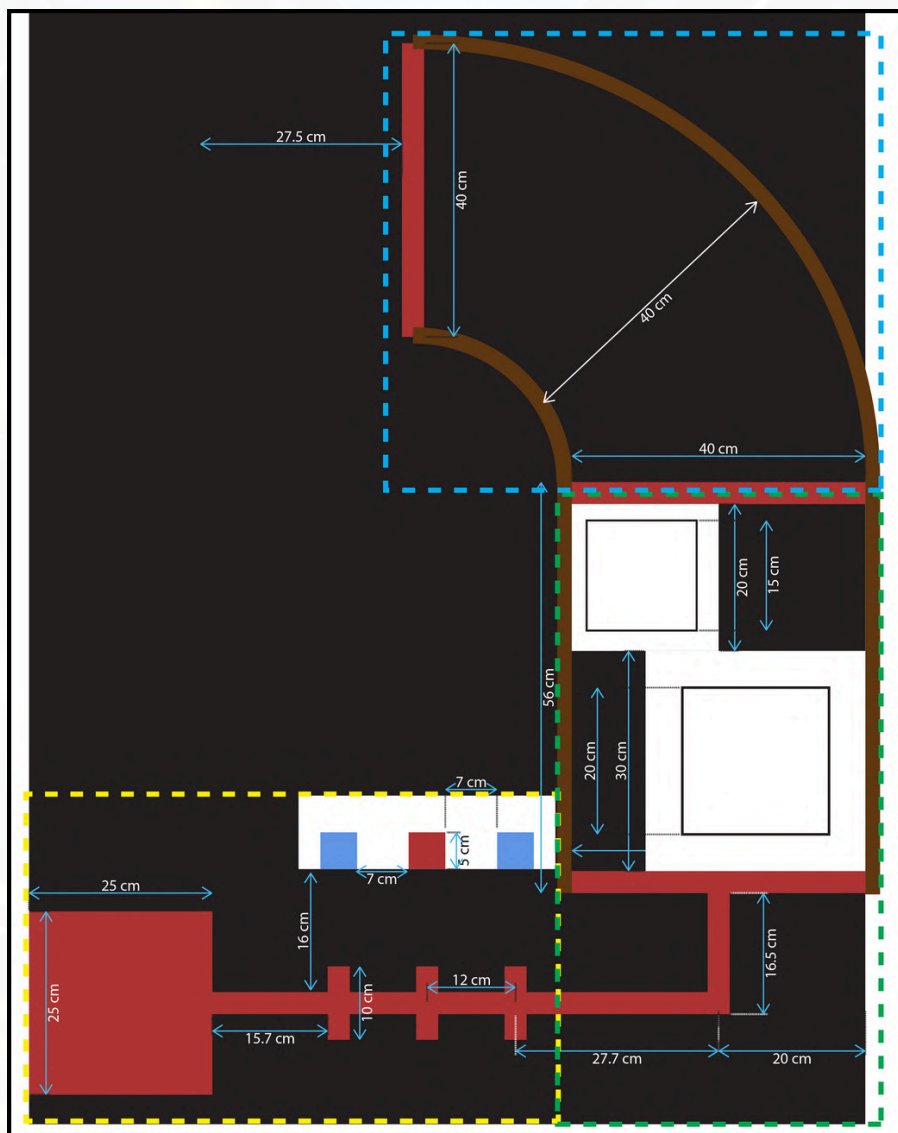- 16 players will advance to next round based on the total based on the marking criteria.

Figure 11: Ellimination round tasks

- After the elimination phase, the **first round will advance in a knockout manner** as it is a race .
- The 16 teams selected for the finals will be paired up in a random manner and allowed to **race under equal conditions (both will have similar arena configuration)** within 15 min and the team that finishes all the tasks first, wins and advances to the next round. If neither team manages to complete a satisfactory amount of tasks the team that has more marks at the end would advance to the next round. (Marking criteria for each task are specified separately)

CHAPTER 8
TOURNAMENT FORMAT

First Round

- 16 teams will compete in duals.
- Teams will be divided into 4 groups according to the rankings of the elimination round. Two games will be played in each group.
- In each group, group toppers will compete with the last in the group in game 1 and middle teams will compete with each other in game 2.
- Winners of the two games will move on to the next round.
- Two team leaders have to be present at the organizer's desk within 5 minutes after calling their names.
- Organizers will let **team leaders randomly pick their arena colour**.
- Winners of the first round will move on to the Quarter Final Round.

	Game 1		Game 2	
Group A	1st	16th	12th	5th
Group B	2nd	15th	11th	6th
Group C	3rd	14th	10th	7th
Group D	4th	13th	9th	8th

Table 2: Fixtures

Quarter Finals Round.

- 8 teams will compete in duals.
- Winners of each group in first round will be drafted in the quarter finals round as follows,
- Winners of the Quarter Final rounds will move into the Semi Final Round.

QF 1	Group A, Game 1 winner	Group D, Game 2 winner
QF 2	Group A, Game 2 winner	Group D, Game 1 winner
QF 3	Group B, Game 1 winner	Group C, Game 2 winner
QF 4	Group B, Game 2 winner	Group C, Game 1 winner

Table 3: Quarter Finals Fixtures

Semi Finals

- 4 teams will compete in duals
- Winners of each group in quarter finals will be drafted in the semi finals round as follows, (Team Leaders will have to randomly pick their colour of arena. prior to a semi final game)

SF 1	QF 1, winner	QF 4, winner
SF 2	QF 2, winner	QF 3, winner

Table 4: Semi Finals Fixtures

Third-Place Playoff

- The two losers of the semi final rounds will compete face to face for the 3rd place.
- Leaders of the two teams will have to select their arena colour randomly.

3rd place	SF 1, Loser	SF 2, Loser

Table 5: Playoff fixture for 3rd place

Final Round for Championship

- The two winners of the semi finals rounds will race face to face to win the ultimate battle to leave the digital world first with the Permanence Code.
- Team leaders will have to toss a coin and select their arena colour, prior to the Final game.

Final	SF 1, winner	SF 2, winner

Table 6: Finals Fixture

NOTE:

The above fixture may be subjected to changes due to the number of registrations and other factors. Modifications will be updated in due course.

CHAPTER 9

JUDGING

- Each team member may be questioned about their robot; every member should clearly understand and be able to explain the robot's working principles and mechanisms. Failure to comply with this requirement would lead to immediate disqualification.
- Furthermore, if any fraudulent activity is detected at any stage of the competition you will be permanently banned from competing in SLRC.
- The code will be checked for hard coding upon judges' request. You should be able to provide a laptop with the code if the need arises.
- No timing bonus will be given unless the robot completes the task.
- The decision of the panel of judges will be the final decision.

CHAPTER 10

CONTACT DETAILS

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Special Note

- Please don't assume anything about the task or the arena if it is not specified in this document. Contact us if you need any clarification.
- This is **version 1.0** of the task document. Please be updated on the **WhatsApp channel** https://whatsapp.com/channel/0029Vb60iUI47XeHJwGN5Z2m and the **SLRC website** https://ent.uom.lk/slrc/ for further updates.