



Universal Robo League

POWERED BY ROBOMATIC



ROBOMATIC

A STREAM BASED EDUCATION

ABOUT THE ORGANIZATION

ABOUT US

ROBOMATIIC is an Educational, Research & Development organization. We are providing Robotics education at Schools / Colleges in **STREAM EDUCATION** and also providing the new product development and industrial solutions in the sector of Industry 4.0.

We provide highly effective Robotics Education through its integrated curriculum materials and equipment that engage and create a passion towards STREAM fields i.e., Science, Technology, Robotics, Engineering, Arts and Mathematics. All programs are result oriented; research and inquiry based and which are all aligned perfectly on International standards. STEM & STEAM are an inevitable concept implemented across 100+ countries. We offer STREAM based courses which have been designed to explore knowledge of students in the field of Science, Technology, Robotics, Engineering, Arts and Mathematics from a young age, to develop inclination towards these subjects and to experience the real world applications eventually to develop the problem solving skills.

We aim to produce the next generation innovators and problem solvers for the world through our unique offerings through our Omni channel presence. Our customized robotic training offers many advantages over the standard approach. Every theory portion of the course is followed by hands-on activity using simulation software and multiple versions of OEM robotic equipment so that each student builds confidence in their ability to navigate and work efficiently on whatever application they may encounter.

Why Us?

We understand the importance of being capable of solving and troubleshooting robotic equipment issues in a timely manner, especially when it disrupts production. That's why each class at Robomatiic is designed to prepare you for what you see and experience out. We want you to walk away from these courses knowing that you can apply what you just learned to your own operations.

Instructors evaluate each student by verifying their work done, accomplish all hands-on written and lab exercises assigned, perform robot testing and recovery procedures, and conduct the pre-test and post-test.

Students and management / Parents know exactly what is learned by comparing pretest and post-test scores, plus course evaluations will let you know how the classes were received and if there are any areas for improvement.

Our teaching philosophy is quite simple: to offer a training curriculum that ensures students' success. From routine selection and cycling to the lesser known yet equally important mastering methods, each class covers application specific processes, troubleshooting techniques, and common procedures.

Looking for something even more specific? We may be able to help.

UNIVERSAL ROBO LEAGUE

Universal Robo League is a prestigious national-level technical competition that brings together the brightest young minds from schools and colleges across the country. Our mission is to inspire and nurture a passion for Robotics, Drone, Science and Technology among the youth, fostering innovation and creativity while promoting teamwork and problem-solving skills. At Universal Robo League, we envision a future where technology and innovation are harnessed for the betterment of society. We strive to empower the next generation of inventors, engineers, and scientists who will lead the way in shaping a brighter tomorrow.

Skills Development

Universal Robo League equips participants with practical skills in Robotics, Drone, Science and Technology, preparing them for future careers in technology and engineering. We encourage participants to think outside the box, fostering creativity and out-of-the-box problem solving.

Teamwork and Networking Opportunities

Our competitions emphasize teamwork, teaching participants how to collaborate effectively with others. Participants have the chance to connect with like-minded individuals, mentors, and industry experts, expanding their horizons and opportunities.

Recognition and Motivation

Outstanding performers will receive awards, Gift Vouchers, and recognition for their achievements, motivating them to excel further. We also aim to celebrate and recognize the achievements of outstanding participants, creating a supportive community that sustains interest in emerging technologies well beyond the event. Furthermore, we emphasize inclusivity and diversity, inviting students from all backgrounds to join us on this educational journey.

Inclusivity and Diversity

Ultimately, our goal is to instill a love for lifelong learning, ensuring that the event leaves a lasting impact on the students and the community it serves.

The vision for Universal Robo League is to inspire and equip the next generation of innovators, engineers, and scientists with the skills, creativity, and collaborative spirit needed to harness technology and innovation for the betterment of society. We aim to foster a community of diverse talents, celebrate achievements, and promote lifelong learning, ultimately driving positive societal impact and shaping a future where technology is a force for positive change and progress.

RULES AND REGULATION

RULES AUTHORITY

There are several rules and restrictions, which are to be followed by each and every team. Robomatiic reserves the right to modify each and every rule associated with the event. Violation of rules by anyone of the participating member may be liable to be penalized severely, inclusive of and up to debarring of the team from the competition at any stage or withdrawal of award/awards, as well.

VALIDITY OF THE RULES

The rules will be same throughout the event and any amendments will immediately be made known to all the participating teams through emails and the same will be uploaded on the website www.robomatiic.in

RULES COMPLIANCE

By registering for this event the team, members of the team as individuals, faculty advisors and other personnel of the School/College/University agree to comply with and will be bound by these rules, interpretations or procedures issued or announced by Robomatiic. All team members, faculty advisors and other university representatives are required to cooperate with, and follow all instructions, penalties and results from competition organizers, officials and judges.

LOOPHOLES

It is virtually impossible for a set of rules to be so comprehensive that it covers all possible questions about the project and its parameters or the conduct of the competition. Please keep in mind that safety remains of paramount importance during the Event, so any perceived loopholes should be resolved in the direction of increased safety/concept of the competition.

VIOLATIONS OF INTENT

The violations of intent of a rule will be considered a violation of the rule itself. Questions about the intent or meaning of a rule may be addressed to the organizers

BEHAVIORAL ATTITUDE

UNSPORTSMANLIKE CONDUCT

In the event of unsportsmanlike conduct, the team will receive a warning from an official. A second violation will result in expulsion of the team from the competition. Failure of a team member to follow an instruction or command directed specifically to that team or team member would result in a penalty card.

ARGUMENTS WITH OFFICIALS

Argument with, or disobedience to, any official may result in the team being eliminated from the competition. All members of the team may be immediately escorted from the grounds.

SMOKING AND ILLEGAL MATERIAL

Alcohol, illegal drugs, weapons or other illegal material are prohibited on the event site during the competition. This rule will be in effect during the entire competition. Any violation of this rule by a team member will cause the expulsion of the entire team. This applies to both team members and faculty advisors. Any use of drugs, or the use of alcohol by an underage individual, will be reported to the local authorities for prosecution.

PARTICIPANT ELIGIBILITY

INSTITUTION ELIGIBILITY

Colleges that are recognised and accredited by UGC (University Grants Commission) and AICTE (All India Council for Technical Education) can apply for this contest.

STUDENTS ELIGIBILITY

Students studying under these institutions

- College students studying **Engineering** and **Science** disciplines

Innov8 Students Challenge

About the Event

The primary objective of the event is to promote STREAM education among college students. We aim to ignite a passion for STREAM - Science, Technology, Robotics, Engineering, Arts, and Mathematics by showcasing projects that align with these fields. In doing so, we hope to encourage creativity and innovation among the young minds participating in the event, allowing them to explore unique project ideas while developing crucial problem-solving skills.

The event will provide students with a platform to enhance their presentation and communication skills, essential attributes in today's competitive world. Through collaborative learning experiences, we intend to foster teamwork and highlight the interconnectedness of STREAM disciplines. Moreover, by introducing students to potential career paths in these fields, we aspire to inspire their academic and professional pursuits.

We also aim to celebrate and recognize the achievements of outstanding participants, creating a supportive community that sustains interest in emerging technologies well beyond the event. Furthermore, we emphasize inclusivity and diversity, inviting students from all backgrounds to join us on this educational journey. Ultimately, our goal is to instill a love for lifelong learning, ensuring that the event leaves a lasting impact on the students and the community it serves.

Themes for the Contest

Optimize the Existing system / New Product development enhanced with the given Industry 4.0 Technologies:

- Robotics
- Drone
- Automation
- IoT
- Artificial Intelligence
- Smart Vehicles
- Renewable Energy

The Project **must be mapped** with the above given themes. Projects which **will not fall** under the above themes **will not be entertained**. Participants are required to create the project that exclusively involves **hardware** components.

The project can take the form of either a **functional prototype** or a **completed product**.

Mode of Innov8 Challenge

1. Pre-screening and first round of Evaluation will be organized through Online Mode by the Organizing Committee.
2. Screened Teams will be felicitated at the physical Nodal Centers across TamilNadu.

College Registration

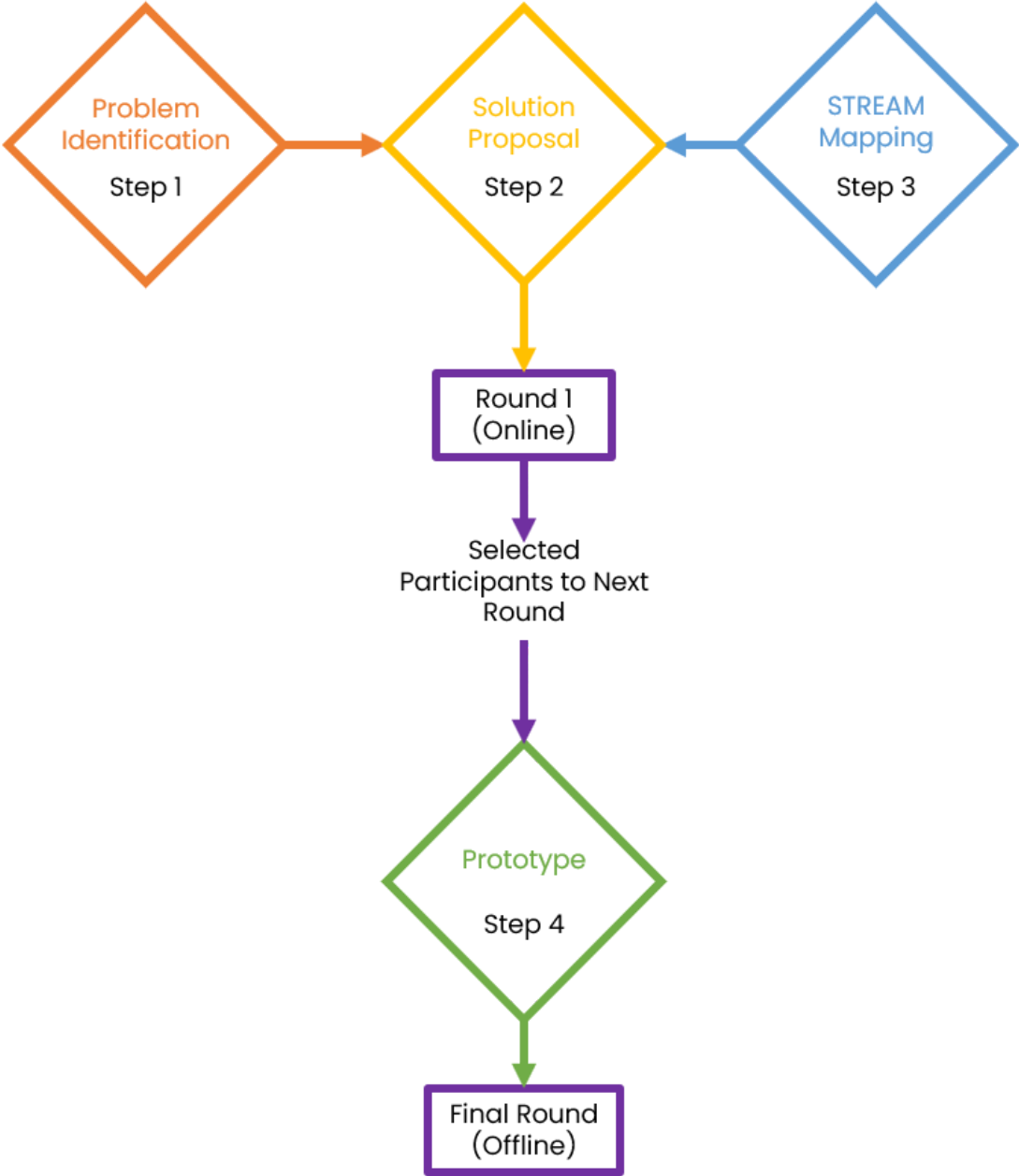
1. College REGISTRATION is open on the **ROBOMATIIC website - robomatiic.in** any college can nominate their teams through the portal. This Innov8 Challenge is for **Engineering** as well as **Science** students.
2. **SPOC** (Single point of contact) is the person (Principal / Vice principal / Registrar / Any faculty nominated by the principal) who will represent the college and carry out the registration process.
3. Each team nominated by the SPOC can have a Maximum of **5 members** (including the team leader). Each team can have a single team mentor (optional) (The mentors could be Professors/ Assistant Professors / Head of Departments)

Team Formation

1. A team can be formed with a minimum of **2 students** to maximum of **5 students** and a **single mentor**.
2. All students within a team should be from the **same college**. Inter-college teams are not allowed.
3. Integration of years on teams is allowed. All members in a team can be of different years.
4. **Team Name** should be **unique** and should not contain the name of their **institute in any form.**(Example - Inquisitive Minds, Brainiacs, Lab rats)

Process Flow Diagram

Process Flow



Working On Problem Statement

Open innovation:

Teams can work on any Problem Statements of their own. Students can come up with their own model based on the theme.

Submission of Ideas:

The SPOC have to register the selected teams on the **ROBOMATIIC website - robomatiic.in** along with the following details

1. Team Name.
2. Name, gender, Email id, Mobile Number of all members of a team.
3. Chosen **Problem Statement** and its **proposed solution** with a title, description & presentation PDF.
4. College Authorization Letter (**Bonafide Certificate**).

Mentoring and Evaluation Sessions:

1. During the **mentoring session** the team members can interact with the judges and representatives from the organizations gaining valuable feedback on the **progress of their work** and how it can be improved.
2. The evaluation session in the evening is when the teams give a **presentation** of their **application / prototype** or **solution** and answer the **jury's questions**.
3. Each **team had a scheduled time slot** of **approx. 10-20 min** for each of these sessions conducted via web conference.
4. For the final evaluation session, the teams had to give a **complete walkthrough** of their **application/prototype** developed during this event and also submit a final **presentation document as PDF**.

Judging Criteria

1. Creativity & Innovation
2. Critical Thinking & Problem Solving
3. Interdisciplinary approach of project
4. Presentation Skill

Fastest Line Follower

Registration and Team Formation

- A match is played by a **single team** in one go, with each team consisting of **1 Wireless Bot**
- Construct a team of a **minimum of 2 and a maximum of 4 members**. Any institution
- Register team for the specified competition online on the [official ROBOMATIIC website](#) only.
- Construct a wireless autonomous Bot. Ready-made bots will not be allowed to compete

Line Follower Bot Parameters

The participating bots should be wired or wireless and controlled remotely. It can be circular / Rectangular in style. Bot must fit inside a **20 centimeters** wide and **20 centimeters** high cube at any point in time. Maximum weight should not be more than **3Kgs** (including battery for wirelessly controlled bots. However, a tolerance of **5%** is acceptable.). Participants need to ensure:

- Batteries must be **sealed**, immobilized electrolyte type (gel cell, lithium, NiCad, or dry cells).
- The electric voltage anywhere in the machine can be used up to **24V DC** at any point in time for each robot.
- **Infrared light-reflecting materials must not be used on the outside**. If robots are painted, they must be painted matte. Minor parts that reflect infrared light could be used only if other robots are not affected. Robots must not produce magnetic interference for other robots on the field.
- The robot must be **autonomous**
- No wireless communication between bot and operator will be allowed. Bluetooth, RF Module, etc not allowed on bot.
- Robots must be constructed and programmed in a way that their movement is not

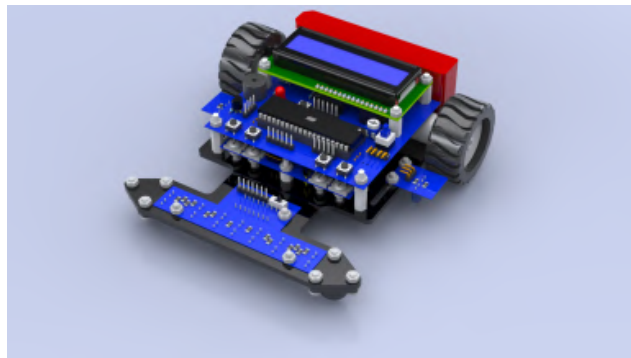
limited to only one dimension and must move in all directions.

- Any robotic parts/building material can be used until the robot meets the above specifications and if the design and construction are primarily the original work of the team as ready-made robots are not allowed to compete in the competition.

Racing Track :

The Racing track of the Fastest Line Follower challenge has a track of a total length of **180 - 200 ft** (approximately) on an arena dimension of **24X24 SqFt**. The width of the black line will be **25mm**. The surface of the track will be white with a black line marked on it. The track may contain crossed, curved, or discontinuous black lines.

Demo Robot



Gameplay :

The robot will be placed at the starting point with the consent of the referee.

- Bot may restart the run if the person handling it feels the necessity. A restart can be requested only if the robot doesn't follow the line, has stopped halfway, or has lost the directions/Black line.
- At any restart, the robot must be re-positioned back at the start point.
- It is not allowed to reprogram the robot or to add/remove parts on the robot during the run, but adjusting the sensors is permissible with the consent of the referee.
- The RACE CLOCK/RUN TIME will reset to zero on every restart. The COMPETITION CLOCK (maximum access time) will keep running during all restarts.
- Only 3 restarts are allowed for each round. A robot must restart if bot does not start after pressing the Start Button for 30 Seconds, bot is touched by a human without the consent of the referee, bot moves out of the arena or the referee orders it to restart.
- There will be two rounds in Fastest Line Follower gameplay i.e. **Elimination round** and a **Final round**

Elimination Round:

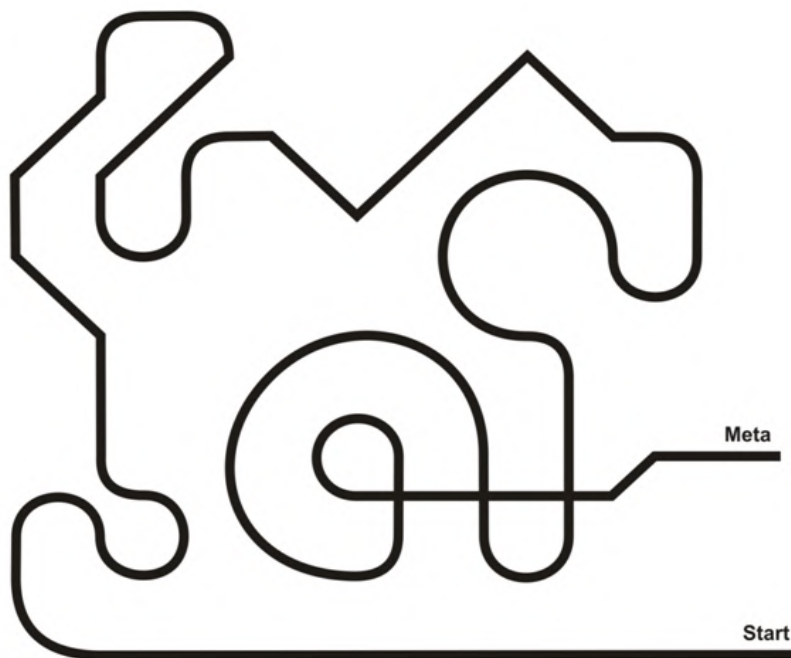
- Every team will be given 1 minute time to calibrate the bot and maximum 3 minutes for game play. 1 minute of calibration time will not be included in gameplay time.
- If Bot loses the track, bot operator can touch bot maximum 3 times during the overall gameplay in all trials.
- Within 3 minutes of gameplay duration, the team will get a maximum 3 trials. Minimum time will be considered in all 3 trials.
- Maximum 30 teams would be qualified who reach the finish line in minimum time duration.

Final Round:

Qualified teams will compete in this round to achieve the minimum runtime. A single run will be conducted for each qualified team. Teams with the minimum runtime will be nominated as the winner of the competition.

- Team would be given 1 minute for calibration and maximum 5 minutes for gameplay.
- If Bot loses the track, bot operator can touch bot maximum 3 times during the overall gameplay in all trials.
- Within 5 minutes of gameplay duration, the team will get a maximum 3 trials. Minimum time will be considered in all 3 trials.
- Winners would be selected based on who reached the finish line in minimum time duration.

Sample Track:



Robo Race

Registration and Team Formation

A match is played by **three teams** in one go, with each team consisting of **1 Wired or Wireless Bot**

- Construct a team of a **minimum of 2 and a maximum of 4 members**. Any institution
- Register team for the specified competition online on the [official ROBOMATIIC website](#) only.
- Construct a Wired or wireless autonomous Bot. Ready-made bots will not be allowed to compete

Bot Parameters

The participating bots should be wired or wireless and controlled remotely. It can be circular / Rectangular in style. Robot must fit inside a **30 centimeters** wide and **20 centimeters** high cube at any point in time. Maximum weight should not be more than **5Kgs** (including battery for wirelessly controlled bots. However, a tolerance of **5%** is acceptable.). Participants need to ensure:

- Batteries must be **sealed**, immobilized electrolyte type (gel cell, lithium, NiCad, or dry cells).
- The electric voltage anywhere in the machine can be used up to **24V DC** at any point in time for each robot.
- **Infrared light-reflecting materials must not be used on the outside**. If robots are painted, they must be painted matte. Minor parts that reflect infrared light could be used only if other robots are not affected. Robots must not produce magnetic interference for other robots on the field.
- The robot can be **autonomous** or **manually controlled** using a **Remote-control system**.
- Robots must be constructed and programmed in a way that their movement is not limited to only one dimension and must move in all directions.
- Any robotic parts/building material can be used until the robot meets the above specifications and if the design and construction are primarily the original work of the team as ready-made robots are not allowed to compete in the competition

Race Track:

- The Racing track has 3 bot lanes of a total length of 80-100 Feet (approximately) with a dimension of 32X24 SqF arena.
- At the starting point, each bot lane would be 40cm appx and the track would be 120cm wide.
- At certain checkpoints before the hurdles, the track can be 80cm wide.
- The surface and course line may have unevenness as well as different hurdles will be there on the race track trying to slow down the Bot.
- Predefined Obstacles for the competition will included

Gameplay:

The robot must start behind the starting mark and is considered to have crossed the finishing line. Bot must be manually/autonomously controlled, and it should be capable of traversing over different terrain and hurdles without going outside the track. . There would be multiple rounds in Competition until the top 3 winning teams were selected. Racing tracks for each round can be changed.

Each round would have a maximum 8 minutes racing time and 2 minutes for readiness. Readiness time will not be included in racing time. Bot reaching first to finish line, will be declared winner for respective round. All bots are expected to cross all hurdles on the track.

Each run will start from the starting point. The operator may abort a run at any time. Each team will get a maximum 3 chance to touch the bot in each round. If an operator touches the robot during a run, the team will start from the previous checkpoint. If a robot has already crossed the finish line, it may be removed at any time without affecting the runtime of that run. During the run, the team may change batteries or fix minor technical issues.

The run timer will start when the front edge of the robot crosses the start line and stops when the front edge of the robot crosses the finish line. If there is a tie, both bots will be selected for next round

First Round: Minimum 3 Racing Bots would be playing in each round. Team schedule would be announced before competition day. If 1 bot is missing in the first round, 2 other bots would be competing in Race. If 2 Bots are missing, present one bot would be declared winner for that round.

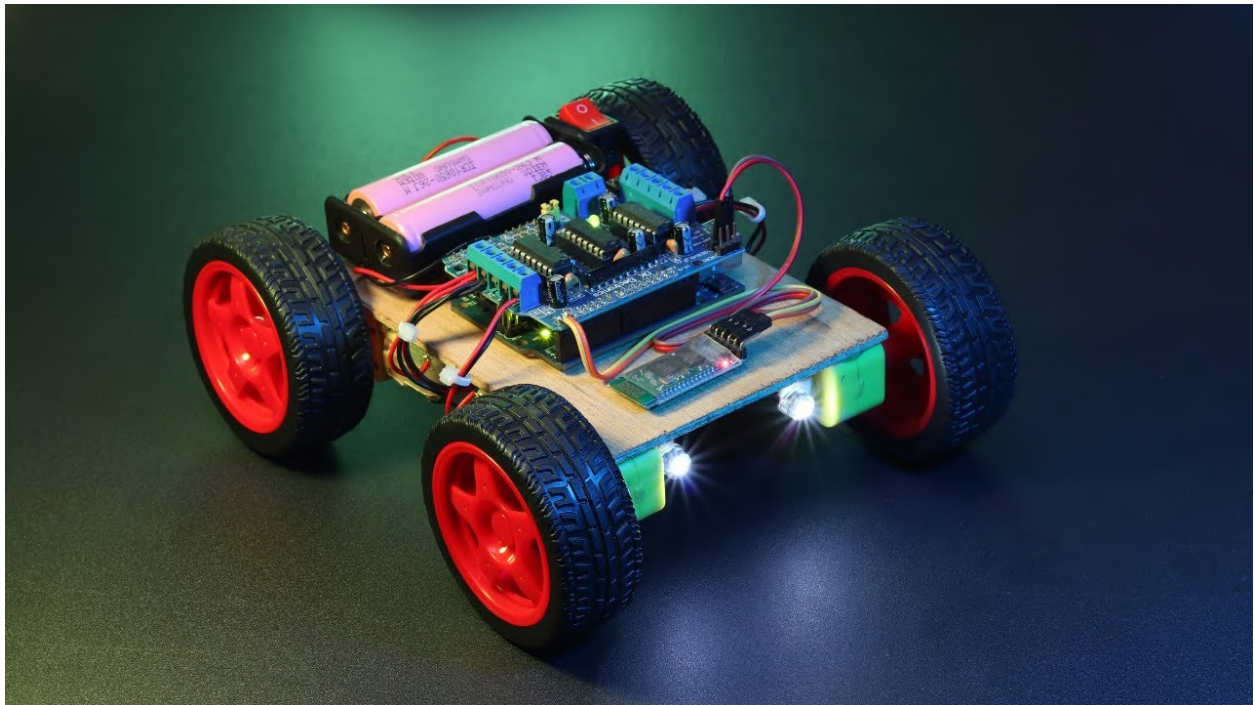
Qualifying Round: There can be multiple qualifying rounds, depending upon the number of teams competing. In each round, a minimum 1 team will be qualified for the next round whosoever reaches the finish line first as well as within an 8 minutes timeline.

Elimination Round: Elimination in the qualifying round will go on until the last 3 teams are left.

Determining the winner:

Final round will happen among the last 3 teams and 1st, 2nd and 3rd winners will be decided as per performance of the team in the final round.

Race bot:



Robo Soccer

Registration and Team Formation

A match is played by two teams, with each team consisting of 3 bots and one of which may be the keeper.

- Construct a team of a **minimum of 2 and a maximum of 4 members**. Any

institution.

- Register team for the specified competition online on the [official ROBOMATIIC website](#) only.
- The team has to build wireless or wired controlled 3 bots, out of which one may be the **keeper** and the rest can be a **striker**.

Robot Soccer Bot Parameters

The participating bots should be wired or wireless and controlled remotely. It can be circular / Rectangular in style. Bot must fit inside a **300 mm** wide and **400 mm** high cube at any point in time. Maximum weight should not be more than **2.5 Kgs** (including battery for wirelessly controlled bots. However, a tolerance of **5%** is acceptable.). Additionally, the top of the robot must adhere to the standard pattern size and surface constraints. Dribbling devices that actively exert spin on the ball, which keep the ball in contact with the robot are permitted under certain conditions. Participants need to ensure:

- Each team should have three robots for the full tournament. The substitution of robots during the competition within the team or with other teams is forbidden.
- Batteries must be **sealed**, immobilized electrolyte type (gel cell, lithium, NiCad, or dry cells).
- The electric voltage anywhere in the machine can be used up to **24V DC** at any point in time for each robot.
- **Each robot must carry a top marker (1, 2, and 3) unique identity** so that it can be distinguished by the referee easily. Unmarked Robots are not eligible to play.
- The robot must not emit infrared light. However, optical sensors (e.g. infrared-distance-sensors) may be used if they do not affect other robots.
- **Infrared light-reflecting materials must not be used on the outside.** If robots are painted, they must be painted matte. Minor parts that reflect infrared light could be used only if other robots are not affected. Robots must not produce magnetic interference for other robots on the field.
- If a team claims that their robot is affected by the other team's robot in any way they must show proof/evidence of the interference. Any interference must be confirmed by a Referee if a claim is placed by the other team.
- The robot can be **autonomous or manually controlled using a Remote-control**

system.

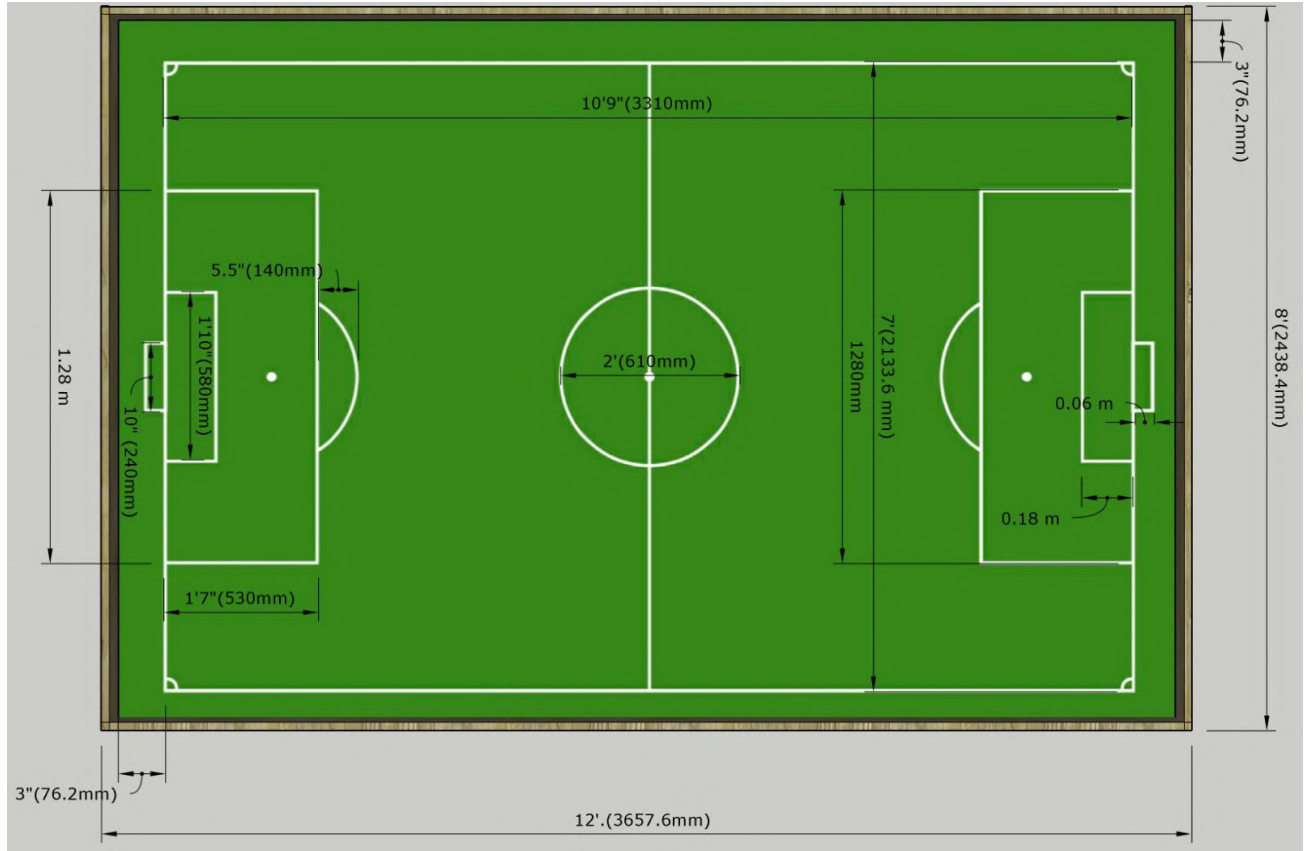
- Robots must be constructed and programmed in a way that their movement is not limited to only one dimension and must move in all directions.
- Any robotic parts/building material can be used until the robot meets the above specifications and if the design and construction are primarily the original work of the team as ready-made robots are not allowed to compete in the competition.

Tournament Balls

The diameter of the ball must be **42mm (+- 5mm)**. A well-balanced ball shall be used. The ball must be able to resist wear and tear during the gameplay. **Robot Soccer Arena**

The playing field will be rectangular and of the following size:

- The total **arena-size would be 12 Feets X 8 Feets** and the **playing area may vary**. The exact field dimensions and the field markings at the venue may vary by **up to ±10%** in each linear dimension.
- The floor consists of green carpet on top of a hard-level surface. All straight lines on the field will be painted white and have a thickness of **50 mm**.
- The field has two goals, centered on each of the shorter sides of the playing field. The goal inner space is **180 mm** in width, **580 mm** high, and **180 mm** deep, box-shaped. It has a cross-bar on top (to prevent robots from entering the goal and to allow checking if the ball scored). The goal posts are positioned over the white line marking the limits of the field.
- A center circle will be drawn on the field. It is **610 mm in diameter**. It is a thin white marked circle. It is there for Referees and Captains as guidance during the kick-off.
- In front of each goal, there is a **530 mm** wide and **1280 mm** long penalty area. The penalty area is marked with white lines of **50 mm** in width. The line is part of the area. A robot is considered inside the Penalty Area when it is completely inside.
- The figures below show the dimensions of the field, the goals, and special field areas, measured in millimeters between the line centers.



Robot Soccer Game Play:

Teams:

- Two teams will compete against each other.
- Each team consists of three robots, which can be autonomous or manually operated.

Game Duration:

- The total game duration is 10 minutes, divided into two halves.
- Each half lasts 300 seconds, with a 150-second break in between.
- The game clock runs continuously during the halves, except when a referee needs to consult an official.

Team Arrival and Reporting:

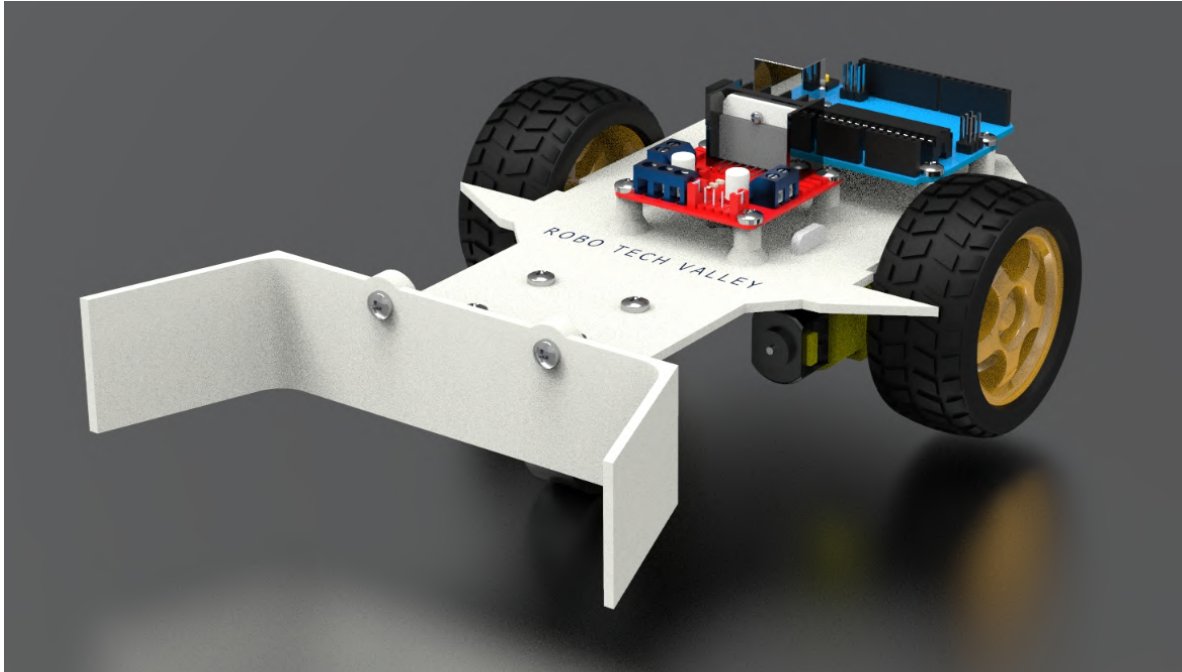
- Teams must report to the referee 5 minutes prior to the start of the game.
- Time spent at the inspection table does not count toward the 5-minute limit.
- Penalties may be applied at the referee's discretion for late arrival, resulting in one

goal being awarded to the opposing team for each minute of delay.

Forfeiture:

- If a team fails to report within 5 minutes of the game start time, it forfeits the game.
- The winning team is awarded a 5-0 win.

Demo Robot



Drone Racing Challenge

Registration and Team Formation

A match is played by a **single team** in one go, with each team consisting of **1 Drone**.

- Construct a team of a **minimum of 2 and a maximum of 4 members**. Any institution (**College/University/Vocational Institution**) or group of students (within defined age), may form a team.
- Register team for the specified competition online on the [official ROBOMATIC](#)

[website](#) only.

Drone parameters

The team must have a Drone (Tri, Quad, or Hexa)

- The complete Drone (including Battery and landing gear) should be of length minimum **200mm*200mm (L*B)** and maximum **500mm*500mm (LxB)** (Measured diagonally – motor shaft to shaft / Wheel Base of the Drone frame) and must weigh **less than 2Kg**.
- There is no restriction on the use of any frame material or specification of the BLDC Motors, Electronic Speed Controllers, Propellers, Batteries, and Weight of the Drone.
- The Drone must be electrically powered only.

Drone Racing Track

The field area would be 400 square feet

- There are marked/specified regions/spots to take off and land the drone.
- Hurdles will be placed at different locations in the arena.
- Fields will have arrows marked to depict the maneuvering path.
- Time will be given to the teams for charging their batteries at the completion of every stage. The requirement of time of charging the batteries during the conduct of competition will not be entertained.
- Specific checkpoints will be defined in the arena for changing the batteries, adjusting gains, calibration of sensors, etc.

Drone Game Play

Pre-Game setup:

- The Drone will be evaluated on various parameters such as design, construction, and innovation.
- Every aspect of the Drone will be observed for scoring which includes the connection of various parts, fixing of components, materials used, aeromodelling, etc.,

Game Clock: The game clock starts as soon as the referee commands the beginning of the

round and stops as soon as the maximum access time (5 Minutes) of that round elapses.

Run Time: Run time starts as soon as the game clock starts/the drone takes/off and stops when the drone lands successfully.

Flight time:

The flight time will be the official time taken by each drone.

- A maximum of two attempts will be provided to complete the challenge. The circuit needs to be completed without avoiding any of the hurdles. The best score out of the two attempts will be considered the official score for the round.
- The maximum time allotted to complete the round is 5 min.
- Evaluation in the stability of the Drone and the controlling ability of the pilot.
- The Drone has to travel through the gaps in the various hurdles, perform maneuvers and complete the circuit in the minimum time possible.
- Points will be awarded for each hurdle and will be scored based on the perfection in control of flight and the time taken to complete the circuit.
- The drone has to be landed within the boundary of a predetermined circular landing spot
- If the drone crashes negative points will be awarded and the run time of the flight will reset but the game clock continues to run.

Determining the winner:

The team completing the round in the minimum time to complete the round and scoring the maximum point will be nominated as the winner of the competition.

Radio control requirements:

Radio systems MUST NOT cause interference to other frequency users. At drone, only the 2.4ghz DSS (Digital Spread Spectrum) frequencies are allowed. Radio telemetry is permitted on 433MHz and 2.4GHz.

