



EVER **V**

TRACKS AND REGISTRATION



Under the auspices of:



The Arab Republic Of Egypt
The Cabinet

Owned by:



الأكاديمية البحثية العلمية والتكنولوجية
ACADEMY OF SCIENTIFIC RESEARCH
AND TECHNOLOGY

Organized by:





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ACADEMY OF SCIENTIFIC RESEARCH
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ARTICLE 1: ADMINISTRATIVE REGULATIONS

- It is the responsibility of every participating team to ensure the Official Rules are read and understood.
- The EVER V competition rules are classified in the following documents:
 1. Tracks and Regulations (this document).
 2. Dynamic Track Chapter 1 Rules (Dynamic Track only).
 3. Concept Track Rules (Concept Track only).
 4. Autonomous Track Rules (Autonomous Track only).
 5. Cost Event Rules (All tracks).
 6. Business Rules (All tracks).
- Each document represents a set of specific rules to be followed by each track participating teams.
- In this document and the following ones, functions and roles are defined as follows:
 - 'Organizers' – the specific personal that organizes the EVER event.
 - 'Team' – group of individuals with a team name and one vehicle that has been accepted for entry to the EVER.
 - 'Participant' – member of a Team.
 - 'Team Manager' – a Participant that has been appointed on the event registration document as a single focal point for his/her team for the Organizers.
 - 'Team vice manager' – a participant who's appointed by the team to follow up with the EVER organizers in case the team leader is unavailable, the vice manager should be up to date with all the required details.
 - 'Faculty Advisor' – a professional staff member of the educational institute which the Team represents.
 - 'Driver' – a team member responsible for driving the participant car, no other member is allowed to drive.





- 'Technical Director' – person appointed by the Organizers, is responsible for managing and ensuring the technical standards and integrity of the EVER competition.
- 'Race Director' – person appointed by the Organizers, who is responsible for managing and sanctioning all on-track activities.
- 'Track Marshal' – person appointed by the Race Director to act on his/her behalf, to ensure on-track safety and observe on-track rule compliance.
- Failure to submit any organizing or technical documents before the deadline will be treated as follows or as instructed through emails:
 - The team will receive a warning for the first violation.
 - 50 points deducted for every other violation.
 - After the 50 points deduction the team will be restored to warning status and so on.
 - This penalty applies to all submissions whether communicated through the official timeline or through emails.
- Failure to comply with the EVER Organizers team instructions.
 - The member will receive a warning for the first violation.
 - The member will be banned from the competition for the 2nd violation.
- Inappropriate/non-ethical behavior or safety breach
 - The member will receive a warning for the first violation.
 - The member will be banned from the competition for the 2nd violation.
 - 50 points penalty for the team with the 2nd violation.
- Administrative regulations that are concerned with the race day will be announced later on.

ARTICLE 2: REGISTRATION

- Applications to enter the competition are via online registration through the competition website.





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- By fact of registration, participants accept all provisions of the official rules shown in the abstract above as well as all the rules announced including all chapters and agree to abide by all decisions made by the event organizers.
- For each application, university name, a team manager, and a faculty advisor must be designated. In addition, a university endorsement letter must be submitted.
- In the university endorsement letter, the university needs to pledge support for the team's transportation and accommodation and any other extra costs which not covered by the competition for its team in case of acceptance to participate in EVER Egypt.
- Accepted teams are committed to all competition stages after receiving the EVER support.
- The minimum number of members in one team (Dynamic – Concept) is 10 including the team manager and 3 drivers.
- The minimum number of members in the Autonomous Track is 7 including the team manager.
- All team members including the team manager must be students enrolled at the registering institution.
- The team manager is the team's sole official contact person with the organizers. All information will be addressed to him/her. For the purposes of the project, he/she will be responsible for the team, must speak on behalf of the team and must be able to understand and speak English.
- The team supervisor maybe contacted by the competition organizers under certain circumstances under the discretion of the competition.
- The vice team manager should also be able to understand and speak English.





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- Faculty advisor's main role is to support the team technically and represent the team with official issues with the faculty and university.
- The competition administration must be notified before changing the advisor.
- The main communication channel between the team leader and the competition is the official emails:
 - (info@electricvehiclerally.org)
 - (technical@electricvehiclerally.org).

Accordingly, any tasks, notes, decision sent via any other channels won't be considered.

- Team manager must provide his full contact details (mobile number and email) in the registration and hold full liability in case of miscommunication due to incorrect contact details.
- EVER Egypt is a non-profit event. Registration is open to all universities and institutions.
- The value of support pledged by the University is not for use by or payment to EVER but is to assure the support of the University to its competing team.

ARTICLE 3: TRACKS

- EVER Egypt organizers will review all applications and will start a selection phase to select the competing teams to join the rally.
- Selection will be based on criteria that in short measures the quality of the teams' proposed entry, their spirit of competition of the team and their ability to deliver a competitive vehicle on time.
- Teams registered in any track will be subject to an evaluation and shortlisting process that qualifies them for the next competition phase.
- The shortlisting process is based on submission of documents that are described in the rules.





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- The EVER V competition entry will be based on three tracks:
 - Dynamic track
 - Concept track
 - Autonomous Track
- Teams registered in either Dynamic or Concept track may also register in the Autonomous track.
- Teams registered in the Dynamic or Concept track may only participate in one or the other along the Autonomous Track.
- Teams registered in two tracks must have the minimum number of members for each category.
- The details of each track for the EVER V season are detailed below.
- Only members that are registered will be eligible to attend the next phases.

ARTICLE 4: DYNAMIC TRACK

The dynamic track is intended to teach students, engineers and graduates the science behind building a prototype urban electric vehicle with one seat. Competitors will compete to design, build, test and race the prototype vehicle. The designed vehicle will be subject to testing through a series of dynamic event and the students will have to defend their ideas and methodologies through a series of static events.

- The dynamic track includes all race events on competition day. As well as participation in the static events and the off-track awards which will be announced prior to the competition date.
- Registration for the EVER V Dynamic track is open for teams that have already participated in the previous seasons of the competition.
- Dynamic track is also open for 5 new teams in EVER V and will be selected by a board of judges according to submitted documents.





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- Newcoming teams will be shortlisted according to these milestones on succession (Details for each submission in the relevant section):
 - Business Case (BC).
 - Structural Equivalency Report (SER).
 - Design Report (DR).
 - Design Presentation
- The new teams will be provided with the power-train kit of the EVER competition and technical and educational support given that they pass the shortlisting phase.
- Short-listing selection for the dynamic track to be judged for all the registered teams. This will involve; the review of a “Design Report”, “SER” as well as the “BC” submitted which will measure several concepts implemented by the teams (details in the coming sections).
- Returning teams that are shortlisted will qualify for the EVER support package.
- New “National” teams that are shortlisted will also qualify for the EVER support package.
- International teams must follow the exact specifications of the powertrain kit provided by EVER.
- The international teams’ powertrain kits will be subject to inspection.
- Returning and newcoming teams that score below a minimum in the Design report and SER submission will be allowed to participate in the concept track.
- Some returning and newcoming teams may be asked to present their ideas to a panel of professional academics and industry personnel if they fail to demonstrate their skills in the design report.
- All teams participating in the dynamic track maybe transferred to the concept track if they fail to meet the competition milestones.
- Teams that qualify after the submissions and presentations will be supported with technical and educational support.





- Teams that do not qualify for the dynamic track may be demoted to the concept track according to organizers discretion.
- The dynamic track consists of two main events: a static event and a dynamic event, the static event has its own scoring system and off-track awards. A scrutineering (technical inspection) will qualify the team for the dynamic event. The team that will not pass the scrutineering will not participate in the dynamic event or allowed on the practice track but can still score points in the static event.
- Teams in the dynamic event are required to submit the following documents (details of each submission is detailed below or as communicated via competition channels):
 - Business Case
 - Engineering Design Report
 - Structural Equivalency Report
 - Initial Cost Report
 - Final Cost Report and Manufacturing Documentation
- Scores given for the static events will contribute to the team's final rank.
- Teams will participate in three main static events which are:
 - Engineering design presentation.
 - Business plan presentation.
 - Cost and sustainability presentation.
- All teams are eligible to compete in the Off-track awards which include:
 - Best interior – ergonomics
 - Best exterior
 - Innovation award
 - Battery Award





- Safety Award
- The offtrack awards will be judged during the competition day and require no submissions (except the innovation and Battery award).
- The details of the race pre scrutineering will be communicated to the teams via the official email before the race day.
- During both the practice runs and the competition, all vehicles must comply with the technical and safety rules of the event. Whenever a vehicle enters the track, the vehicle body must be in place and bear all the competition numbers, sponsor stickers.
- Vehicles not complying with all safety rules or any of the technical rules will not qualify for the competition and will not be allowed on the track for practice or demonstration.

ARTICLE 5: CONCEPT TRACK

The concept track has the same objectives as the dynamic track but without participation in the dynamic event. Students are required to design a similar prototype vehicle but without implementation in reality. Students can manufacture certain vehicle components but at their own discretion.

- Registration for the concept track is open to all universities internationally.
- Teams starting their design will compete in this event which is classified into three main sections:
 - Engineering Design.
 - Cost and manufacturing.
 - Business Case.
- Teams will submit supporting documents throughout their participation and will present their final work and concept vehicle on the competition day. The documents include (details of each document will be presented individually as well as key dates for submission):
 - Business case.
 - Concept vehicle specification sheet.





- Structural Equivalency Report.
- Engineering design report.
- Cost report containing detailed BOM for all systems and Manufacturing Documentation.
- Concept teams will be shortlisted by the BC and specification sheet.
- A presentation on the event day will be formally given to a wide variety of experienced industry professionals from different backgrounds, academic representatives, and marketing specialists.
- Teams will participate in three main static events which are:
 - Engineering design presentation.
 - Business plan presentation.
 - Cost and sustainability presentation.
- The designed vehicle should follow the "EVER V Concept Track Rules".

ARTICLE 6: AUTONOMOUS TRACK

The development of autonomous systems worldwide is pushing several research as well as industrial entities to invest to achieve the dream of having the autonomous vehicle. The levels of autonomy vary ranging from driver assistance systems up to full autonomy level.

Proper trajectory tracking of a specific pre-defined track as well as safe navigation in an obstacle are among the basic fundamentals of developing any autonomous system. Proper tracking guarantees that the vehicle is capable of following its reference trajectory with acceptable accuracy and time. While safe navigation guarantees the safety of the vehicle itself as well as its different environment participants.

In this track of EVER competition, these two challenges will be the main focus points for the Autonomous Track challenge. Teams will compete towards developing the most reliable system that can achieve both these tasks. Performance would be measured and scored to shortlist teams across different milestones of the challenge.





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- All Teams participating in this track of the competition, must implement their work using ROS (Robot Operating System) as the main core of system development.
- Programming languages allowed are Python, C, C++ or MATLAB. (Other programming languages may be allowed after confirming with the organizers of the competition).
- Each team must utilize at least one camera and one LIDAR in their work and algorithm implementation, any extra sensors are allowed.
- Emergency Stop functionality MUST be implemented in the algorithms developed for safety precautions.
- Usage of different ready found ROS packages is allowed, as long as they are adjusted to operate for the tasks detailed below.
- The organization team reserve the right to amend any needed rule to the previously mentioned rules and announce it to all teams through its communication media.
- Each team will be required to work on three different milestones (consecutively). Upon passing each milestone successfully, the team would be promoted to the challenges of the next milestone. The three milestones cover the spectrum of autonomous systems development covered by the competition.
- Milestone (1) will require the implementation of a software simulation of the test vehicle (model will be provided along with its parameters) that presents the team capability of achieving accurate trajectory tracking.
 - Several trajectories will be required from the teams to follow to assess their vehicle performance. Straight line motion with different speeds, Circular Rotation, Infinity Symbol track re among the suggested tracks to be tested.
 - Performance would be measured in two main terms, the accuracy (how close is the vehicle performance relative to the desired trajectory, as well as the speed of the execution of the task.





- Both metrics would be combined together to evaluate the overall score of the team in this milestone, and the successful teams would be promoted to the second stage.
- Milestone (2) two main tasks will be needed from each team.
 - Task one is the continuation along the steps taken in milestone (1), where the performance of the vehicle under different disturbances (road irregularities and actuation/sensing uncertainties) would be assessed using the same metrics explained in milestone (1).
 - The second task is related to the evaluation of environmental perception for autonomous systems.
 - In this stage simulation would still be the main operating platform. Each team would be asked to insert specific obstacles to their simulation environment at predefined locations.
 - The performance of the vehicle would be assessed through the ability of the vehicle to move in its environment while detecting these obstacles.
 - The accuracy of detections would be measured, as well as the speed of the operation of the algorithm.
 - Different obstacles (static and dynamic) would be required to be tested by the teams in the simulated environment and the performance of the teams would be calculated and compared.
 - Teams performing well in the two tasks of milestone (2) would be promoted to the last milestone.
- Milestone (3) is the competition day where the exact details to be communicated.

ARTICLE 7: SUBMISSIONS AND DOCUMENTS

- Concept vehicle specification sheet – Concept Track.
 - The specification sheet will provide design insights to the vehicle design, the spec sheet will have only the overall design targets of the team without diving into the overall design process and details. It will contain quantitative data on all vehicle systems as well as the dynamics and performance specifications.
 - Template of the specification sheet will be provided by the competition organizers.
 - Teams must follow the provided template.





- Structural Equivalency Report – (Concept – Dynamic)
 - This is a form to be submitted individually by each team, all the data required in this form is not related to the design report.
 - The SER is a document that illustrates the chassis design of the team in order to ensure that it is within the rules of the competition and is safe for operation during the dynamic events.
 - The template of the SER must be followed and addition of pages to satisfy rules requirements is acceptable as long as it is following the same guidelines.
 - Template of the SER will be provided by the competition organizers.
- Engineering Design – (Concept – Dynamic):
 - Prior to the event, teams will submit an Engineering Design Report. This document should reflect the current state of development of the designs and outline plans for resolution of outstanding issues/manufacture. Understanding that the vehicle design/manufacture is incomplete, i.e. a non-running vehicle, the judges will be looking at the project planning as well as the design process and will be looking to see evidence of understanding of proposed manufacturing methods and their implications (e.g. costs, tooling requirements, etc).
 - Judges expect to see proof of reasoning for key design and concept choice decisions. In recognition of the “real world” it is further expected that teams will consider fully the costs of manufacture, service, and safety of innovative design choices in addition to the usual parameters of mass and performance and customer appeal. It should be noted that there is an increased link between the information provided to Cost & Manufacturing, Engineering Design and Business case. They also expect you demonstrate greater understanding of how you progress from “paper” to “part”.
 - During the competition day teams will present their work in a scored fashion to a panel of judges.
 - There is no template for the design report. However, there are guidelines and limitations on the number of pages and other details.
 - The design report details are mentioned in each rules section.
- Cost – (Concept – Dynamic – Autonomous):
 - The objective of the cost and manufacturing report is to evaluate the team’s understanding of the manufacturing processes and costs associated with the construction of a prototype race car. This includes trade off decisions between





- content and cost, make or buy decisions and understanding the differences between prototype and mass production.
- Prior to the event teams will submit initial and detailed cost reports whose details are in the Cost Rules document.
 - The initial cost report will follow the same rules of the final cost report except that it would be for the preliminary design and without manufacturing documentation.
 - Deviations between the initial and final cost report are only allowed limited cases only.
 - Details of the cost event submissions is detailed for all tracks in the relevant document.
 - During the competition day teams will present their work in a scored fashion to a panel of judges.
 - The details of the autonomous track cost report are in the appendix of the cost event document.
- Business Case – (Concept – Dynamic – Autonomous):
 - Evaluate the team's ability to develop and deliver a comprehensive business model for a rewarding business venture, related to market sector serving electrical vehicles / autonomous vehicles.
 - Teach participants about the factors that need to be considered when a company embarks on the development of a new product. These include cost; identification of market and likely sales volume; partnerships; market channels; profitability; the key features applicable to the selected business concept and target market size.
 - Ensure teams develop the concept of their entry with all of these aspects correctly considered, from the outset.
 - Teams will submit a Business Case (BC) to showcase their ideas prior to the business presentation during the competition.
 - During the competition day teams will present their work in a scored fashion to a panel of judges.





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