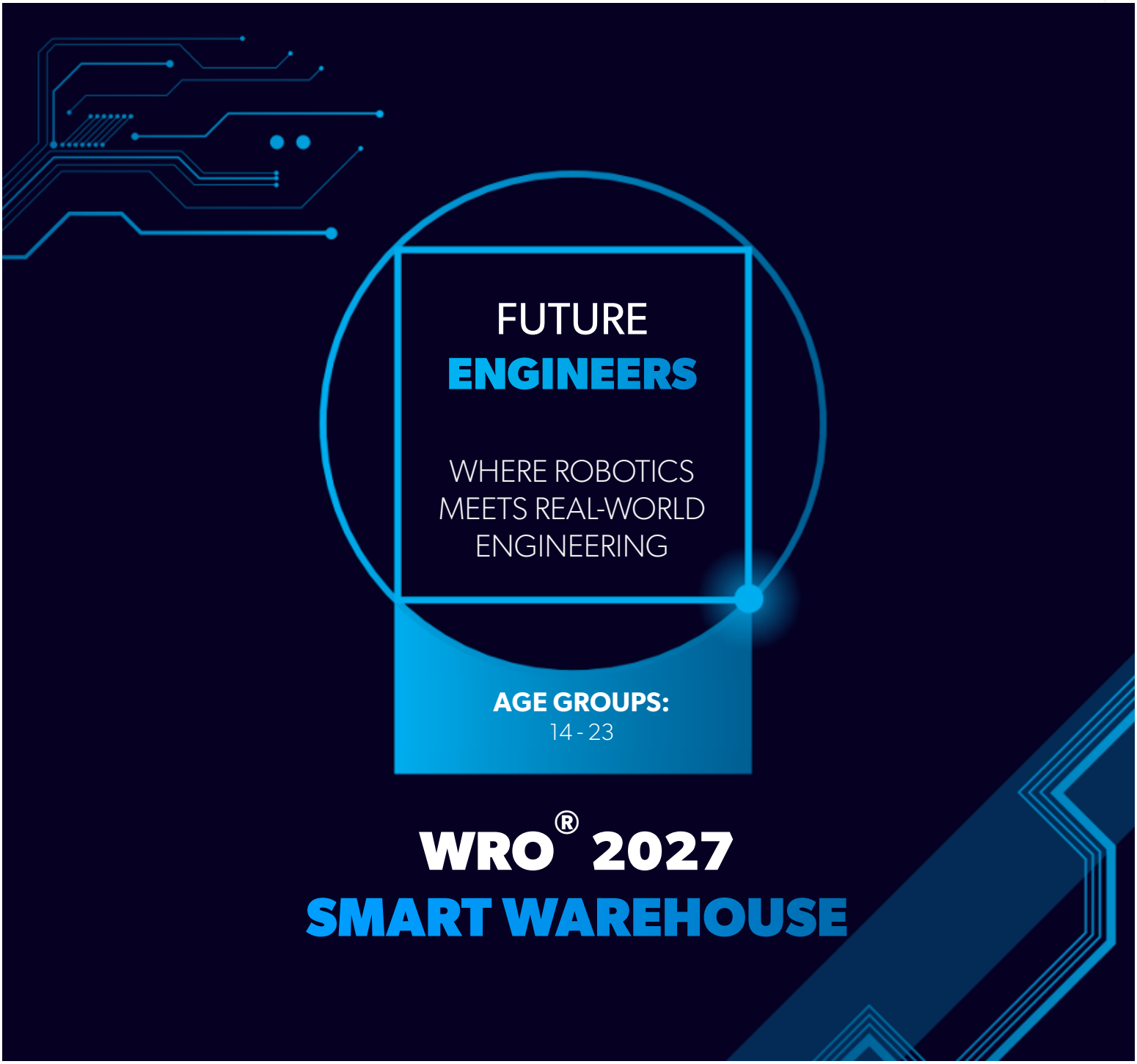
GENERAL RULES

VERSION: 2 November 2026

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Important Note: Use of this document in national tournaments

The rules in this document are used for the judging at International Events. All teams participating in a national WRO competition should use the General Rules as provided by their National Organizer. The National Organizer can adjust the rules to local needs.

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1. General Information

1.1. Introduction

WRO Future Engineers category is an open-platform robotics competition that challenges students to design, build, program, test and continuously improve autonomous robotic systems.

Teams are encouraged to make their own engineering decisions regarding the robot's mechanical structure, electronics, sensors, computing platform, software and manipulation mechanisms. The competition does not require teams to follow a predefined robot architecture or to use a specific robotics platform. The objective of the category is not only to complete the game missions, but also to demonstrate an understanding of engineering principles, autonomous robotic systems and problem solving.

The Future Engineers category follows a multi-year thematic approach. The main competition theme remains the same for at least four consecutive seasons, allowing teams to build on their previous experience, progressively develop their technical expertise, and continuously improve their robotic systems rather than starting from scratch every year.

Within each thematic cycle, small changes and new challenges may be introduced from season to season to encourage innovation and progressive technical development. At the end of a thematic cycle, a new competition theme is introduced, opening the way for a new set of engineering challenges. The specific missions, field elements, scoring conditions, and requirements for each season are described in the annual Game Rules.

1.2. Focus Areas

The Future Engineers category encourages students to develop knowledge and practical skills in the following areas:

- **Mechanical Engineering:** Designing and building reliable robotic structures, drive systems and mechanisms.
- **Electronics and Embedded Systems:** Selecting, integrating and managing controllers, sensors, actuators and power systems.
- **Autonomous Robotics:** Developing systems capable of perceiving their environment, making decisions and operating independently.
- **Software Engineering:** Designing, implementing, testing and maintaining structured and reliable software.
- **Perception and Intelligent Systems:** Using sensors, computer vision, artificial intelligence and other technologies to interpret information from the environment.
- **Engineering Design Process:** Identifying requirements, evaluating alternative solutions, testing prototypes and improving performance based on evidence.
- **Teamwork and Communication:** Collaborating effectively, documenting engineering work and communicating technical decisions.

The emphasis on these focus areas and the technical complexity of the challenges may differ between age groups and evolve gradually from season to season within each multi-year thematic cycle.

1.3. Engineering and Learning Philosophy

Future Engineers is designed to encourage students to approach robotics as an engineering discipline rather than simply as a task of assembling and programming a robot.

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Teams are expected to take ownership of their engineering projects and make their own engineering decisions throughout the development process.

Experimentation, testing, identifying failures, evaluating alternatives and improving solutions are essential parts of the learning process.

For this reason, the competition evaluates not only the performance of the robot during the missions but also the engineering process followed by the team, as demonstrated through its Engineering Documentation. The quality of engineering decisions, the understanding of the developed system and the ability to explain and reproduce the solution are important educational objectives of the category.

1.4. Learning and Team Ownership

Future Engineers encourages students to take ownership of their engineering projects, make independent decisions, experiment with different approaches, and learn through the process of developing their own robotic solutions.

Teachers, coaches, parents and mentors are encouraged to support students by explaining concepts, teaching engineering methods and guiding their learning process. However, the robot and its software must represent the work and engineering decisions of the participating students.

Artificial intelligence tools may support students in exploring ideas, understanding technical concepts, developing software and evaluating alternative solutions. However, their use must not replace students' own engineering decisions. Teams remain responsible for understanding, evaluating and testing any AI-generated outputs they choose to implement.

All participants, coaches and judges are expected to follow the WRO Guiding Principles and Ethics Code and contribute to a fair, respectful and educational competition environment. Detailed requirements regarding team responsibilities, the use of external resources and the role of coaches are defined in Chapter 3.

2. Teams and Age Groups

Team Composition

2.1. A team consists of two or three students and is guided by a coach.
2.2. A team consisting of only one student and one coach is not eligible to participate.
2.3. Each student may participate in only one team and one WRO competition category during a competition season.
2.4. A coach may guide more than one team.
2.5. At international events, coaches must be at least 18 years old.

Age Group Definitions

2.6. WRO Future Engineers category is divided into two age groups:
- **Senior:** students aged 14–19 years *(birth years 2008–2013 for the 2027 season).*
- **Advanced:** students aged 18–23 years *(birth years 2004–2009 for the 2027 season).*

2.7. Age eligibility is determined by the age a student reaches during the calendar year of the competition, not by their age on the competition day. The year of birth is used to determine eligibility.
2.8. All students in a team must meet the age requirements of the age group in which the team participates.

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2.9. Students aged 18–19, who are eligible for both age groups, may choose to compete in either Senior or Advanced. However, each student may participate in only one age group during a competition season.

3. Responsibilities and Team's Own Work

Ethical Conduct

3.1. All teams and coaches must act fairly and respectfully towards other teams, coaches, judges, volunteers and competition organizers. By participating in WRO, teams and coaches agree to follow the WRO Guiding Principles and Ethics Code.

3.2. All participating students and coaches must sign the WRO Ethics Code in accordance with the procedure established by the competition organizer.

Team's Own Work

3.3. The design, construction, programming, integration and testing of the robot must be carried out by the participating students. Teachers, coaches, parents and mentors may provide guidance and educational support, but must not develop the competition solution on behalf of the team.

3.4. Teams are expected to make their own engineering decisions regarding the design and operation of their robotic systems. They must understand the technologies they use and be able to explain the reasoning behind their main design choices.

3.5. Teams must develop their competition solutions independently. Sharing general knowledge, learning resources and technical ideas is encouraged, but teams must not exchange or jointly develop complete robot designs, programs or competition solutions. Identical or substantially identical solutions may be investigated to determine whether they represent independent work.

Use of External Resources and AI Tools

3.6. Teams are allowed to use commercially available components, open-source software, publicly available designs, libraries, frameworks, datasets and pretrained models as part of their robotic systems.

3.7. The use of artificial intelligence tools during the development process is permitted. Such tools may assist students in understanding technical concepts, exploring design alternatives, generating or debugging code, analyzing data and solving engineering problems.

3.8. Teams remain responsible for the solutions they develop, regardless of the tools or resources used. AI-generated code, technical suggestions and other externally obtained material must be critically evaluated, understood and appropriately tested before being incorporated into the robotic system.

3.9. The use of external resources or AI tools does not remove the requirement for meaningful student involvement. Teams must demonstrate their own engineering contribution through the design, integration, adaptation, testing and improvement of their robotic systems.

3.10. Teams must document significant uses of artificial intelligence tools in their Engineering Documentation, in accordance with Rules 7.21 and 7.22.

Role of the Coach

3.11. The coach's role is to support the team's learning, encourage independent problem-solving and provide guidance on engineering concepts, development methods and project organization.

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3.12. Coaches and other adults must not construct, program, configure, test or modify the competition robot on behalf of the students, either during preparation or on competition days.
3.13. During the competition, coaches must remain outside the designated team and competition areas unless permission is given by the competition organizer or a judge.
3.14. Teams must not communicate with coaches or other persons outside the competition area during official competition activities, unless explicitly permitted and supervised by a judge.

Fair Competition and Rule Compliance

3.15. Only registered team members may work on the robot, modify its software or adjust its configuration during the designated preparation and practice periods.
3.16. Teams must not interfere with the robots, equipment, software or competition activities of other teams. Any deliberate attempt to gain an unfair advantage or disrupt the competition is prohibited.
3.17. If judges suspect that a team has violated the rules regarding independent work, external assistance, fair competition or ethical conduct, they may investigate the situation. This may include interviewing team members, inspecting the robot and reviewing its software and Engineering Documentation.

4. Game Documents and Rule Hierarchy

Official Rule Documents

4.1. WRO Future Engineers category is governed by two main rule documents:
- **General Rules:** Define the overall competition framework, including team requirements, robot regulations, autonomous operation, Engineering Documentation, competition procedures, judging and ranking.
- **Game Rules:** Define the specific challenge for the competition season, including the game field, game objects, missions, randomization procedures, scoring conditions and any additional mission-specific requirements.

4.2. The General Rules provide the common framework for the Future Engineers category across competition seasons. They may be revised when necessary to reflect changes in competition requirements, technologies or organizational procedures.
4.3. The Game Rules are published for each competition season and define the specific missions, game elements, scoring conditions and additional requirements for both age groups, Senior and Advanced.

Rule Updates and Questions & Answers

4.4. During a competition season, WRO may publish updates, clarifications or additions to the General Rules and Game Rules. Teams are responsible for checking the latest official versions of the documents.
4.5. Official Questions & Answers (Q&A) may clarify, supplement or modify existing rules. Official Q&A responses form part of the competition rules and are binding on teams and judges.

National Competitions and International Events

4.6. The General Rules and Game Rules published by WRO form the basis for all international events.

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4.7. National Organizers may adapt certain rules or competition procedures to meet local requirements. Any such adaptations must be clearly communicated to participating teams before the competition.
4.8. Teams participating in national competitions must follow the rules and official clarifications published by their National Organizer. International Q&A do not automatically replace local rules or clarifications unless adopted by the National Organizer.
4.9. All teams participating in international events must follow the official rules, even if different rules were applied during their national competitions. Teams are responsible for familiarizing themselves with any differences.

Rule Hierarchy and Interpretation

4.10. The following rule hierarchy applies at WRO international events:
I. The General Rules establish the common requirements and procedures of the Future Engineers category.
II. The Game Rules define the season-specific missions and requirements. Where they explicitly introduce a different requirement for a particular mission or game element, that specific requirement takes precedence.
III. Official WRO Questions & Answers (Q&A) may clarify, supplement or override provisions in either document.
IV. The judging team is responsible for applying and interpreting the rules during the competition.
4.11. If a situation is not explicitly covered by the published rules or Q&A, the judges must make a decision based on the available rules, the principles of fair competition and the intended objectives of the challenge.
4.12. The judging team has the final authority in decisions concerning the application of the rules during the competition. A decision may be reviewed if new relevant information becomes available, according to the competition's judging procedures.

5. Robot Materials and Technical Regulations

Robot Design and Materials

5.1. Teams may use any robotics platform, construction system or material to design and build their robot. No specific robot brand, manufacturer or construction kit is required.
5.2. Commercially available components and custom-made parts are permitted. This includes, but is not limited to, 3D-printed, laser-cut, CNC-machined, wooden, plastic and metal components.
5.3. Teams may use any type and number of controllers, onboard computers, sensors, cameras, LiDAR systems, motors and actuators, provided that all other technical and safety requirements are met.
5.4. Any programming language, software framework, computer vision system or artificial intelligence model may be used.
5.5. All computing and electronic equipment required for the robot's operation during an official run must be installed on the robot. Requirements concerning autonomous operation, communication and external assistance are defined in Chapter 6.

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Robot Dimensions and Configuration

5.6. The robot must not exceed 50 cm in length, 50 cm in width or 50 cm in height before the start of an official run. These dimensions include all installed components, attachments and cables.
5.7. After the robot has started its run, it may extend, unfold or otherwise change its dimensions as part of its autonomous operation.
5.8. The total weight of the robot must not exceed 6.0 kg.
5.9. The robot must be designed as a single, self-contained mobile robotic system. It must navigate and operate as one robot and must not rely on game field elements for structural support. Mechanisms designed to bridge, span or cover a substantial part of the playing field are not permitted.
5.10. Robots are not permitted to fly.

Competition Robot and Spare Parts

5.11. Each team may register and use only one competition robot. The robot may be brought to the competition fully assembled and programmed.
5.12. Teams may bring spare parts and individual replacement components, including spare controllers, sensors, motors, batteries and mechanical components.
5.13. Teams may bring assembled replacement modules, provided that these modules do not together constitute a second complete or operational robot.
5.14. Mechanical, electrical and software modifications may be made during the designated preparation and practice periods, in accordance with the competition procedures defined in Chapter 9.

Power Supply and Batteries

5.15. The robot must use an onboard power supply. External power cables or connections to equipment outside the robot are not permitted during an official run.
5.16. Teams may use any type, brand and number of batteries, provided that they comply with the safety requirements defined by the competition organizer and applicable safety regulations.
5.17. All batteries must be securely installed and used in accordance with the manufacturer's instructions and specifications. Teams are responsible for ensuring that their battery systems, electrical connections and power distribution components are suitable for the intended operating conditions.
5.18. Electrical wiring, connectors and power distribution systems must be properly installed and protected against accidental short circuits, mechanical damage and other foreseeable electrical hazards.
5.19. Battery charging and replacement must follow the procedures and safety instructions established by the competition organizer.

Safety and Protection of the Game Field

5.20. The robot must be designed and operated in a manner that does not present an unreasonable risk of injury to participants, coaches, judges, volunteers or spectators.
5.21. Robots must not contain exposed sharp edges, open flames, hazardous substances or other components that could endanger people or damage the competition environment.
5.22. Moving mechanisms, including wheels, arms, grippers and lifting systems, must be designed and operated safely. Teams are responsible for preventing foreseeable injuries caused by moving or mechanically actuated components.

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5.23. Wheels, tracks and other parts that come into contact with the game mat must not damage its surface or leave substances or residues on it.
5.24. The robot must operate without causing damage to the game field or game objects. A robot that causes damage affecting the integrity or usability of the game field or any game object will be disqualified from the competition.
5.25. Judges may inspect the robot for safety concerns and require the team to correct any identified hazard. A robot may be prevented from participating until the judges are satisfied that it can operate safely.

Tools and Equipment

5.26. Teams may bring tools and equipment required to assemble, maintain, repair or modify their robot during the designated preparation and practice periods.
5.27. All tools must be used safely and in accordance with the competition organizer's instructions. Tools or equipment that present an unacceptable risk to participants, other persons or event facilities may be prohibited by the organizer.

6. Autonomous Operation and Communication

Autonomous Robot Operation

6.1. The robot must operate fully autonomously after the start of an official run. All actions required to complete the mission, including navigation, perception, decision-making and manipulation, must be performed without human intervention.
6.2. Teams may use any suitable approach to autonomous operation, including predefined algorithms, sensor-based control, computer vision, artificial intelligence and other onboard processing methods.
6.3. Manual control, remote operation or human assistance intended to influence the robot's behaviour is not permitted during an official run, except for interventions explicitly allowed by these rules.

Onboard Processing and Communication

6.4. All processing required for the robot's operation during an official run must be performed by computing equipment installed on the robot.
6.5. During an official run, the robot must not communicate with external computers, mobile devices, remote controllers, networks, cloud services or any other equipment located outside the robot.
6.6. Communication between controllers, computers, sensors and other components installed on the robot is permitted only through wired connections. Wireless communication between onboard components is prohibited during official runs.
6.7. Teams may use pre-installed software, trained AI models, stored maps, configuration files and other data prepared before the official run, provided that their use complies with the competition rules.
6.8. All equipment required for the robot's autonomous operation must remain installed on or physically attached to the robot throughout the run.

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Robot Preparation and Starting Procedure

6.9. Before an official run, the robot must be placed in the starting position defined in the corresponding Game Rules. The robot must satisfy all applicable starting-position requirements.
6.10. The robot must be switched off when released from quarantine and brought to the competition field.
6.11. Before the judge gives the start signal, the team may switch on the robot using a single power switch. After being switched on, the robot must enter a waiting state and remain stationary until the official start signal is given.
6.12. Once the judge gives the start signal, one team member may start the autonomous mission by pressing a single physical Start button located on the robot. The button may be integrated into the main controller or installed separately.
6.13. Pressing the Start button must initiate the autonomous mission directly, without requiring any further menu selection, program selection, parameter input or other interaction.
6.14. After the randomization procedure has been completed, teams must not manually enter or communicate any information about the randomized field setup to the robot. This includes entering information through software settings, button combinations, sensor inputs or adjustments to the robot's physical configuration.

Interventions During a Run

6.15. After the robot has been started, team members must not touch the robot, game field or game objects, except to activate the emergency stop in response to an immediate safety risk or when permission is given by a judge under the procedures defined in Chapter 10.
6.16. Team members, coaches and other persons must not provide visual, acoustic, wireless or other signals intended to influence the robot's operation during the run.
6.17. The robot must not deploy, place or leave any team-provided sensors, markers, beacons, cables or other equipment on the game field. All components of the robotic system must remain attached to the robot throughout the run.

Emergency Stop and Safety

6.18. The robot must have an easily accessible physical stop control capable of stopping its moving mechanisms in an emergency, without requiring software interaction. Activating this control must stop the moving mechanisms as quickly as safely possible.
6.19. Judges may require a robot to be stopped immediately if its operation presents a safety risk to people, equipment or the game field. The run then ends, and its scoring and any applicable penalties are determined in accordance with Chapters 10 and 12.

7. Engineering Documentation

Purpose and Scope

7.1. Each team must prepare Engineering Documentation that presents both the final robot and the engineering process followed during its development.
7.2. The Engineering Documentation must provide sufficient information for judges to understand:
- the design and operation of the robot
- the engineering decisions made by the team

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- the relationship between the mechanical, electrical and software systems
- the testing, modifications and improvements carried out during the development process.

7.3. The Engineering Documentation should explain not only what the team developed, but also why particular solutions were selected. Where relevant, teams should describe the constraints, alternative solutions and trade-offs considered during the development process.

7.4. The evaluation of the Engineering Documentation is based on the clarity and depth of the engineering reasoning, the quality of testing and improvement, and the extent to which the robotic system can be understood and reproduced. It is not based on the visual appearance or length of the documentation.

Publication and Access

7.5. Each team must maintain a publicly accessible GitHub repository containing the source code used for the competition robot. The GitHub repository serves as the main entry point for accessing the team's source code and Engineering Documentation.

7.6. Teams may publish their Engineering Documentation on any publicly accessible platform that supports text, images, videos and downloadable files. Examples include, but are not limited to, Notion, GitBook, a public website, or the team's GitHub repository. A clearly visible link to the complete Engineering Documentation must be included on the main page of the team's GitHub repository.

7.7. The GitHub repository, the Engineering Documentation and all required files and links must be accessible without requesting permission or entering a password.

7.8. The GitHub repository and Engineering Documentation must remain publicly accessible throughout the competition season and for at least one year after the WRO season has ended.

7.9. For the International events, the GitHub repository and Engineering Documentation must be provided in English. National Organizers may define the language requirements for their own events.

Source Code Repository

7.10. The GitHub repository must contain the complete source code used by all programmed components of the competition robot.

7.11. The repository must also include all relevant configuration files, model files, dependencies and instructions necessary to set up and run the robot's software.

7.12. The source code must be clearly structured and include meaningful comments so that judges and other interested users can understand the purpose of the main modules and how they contribute to the operation of the robot.

7.13. The main page of the GitHub repository must contain a README file that:

- provides an overview of the robotic system
- explains the organization of the repository
- identifies the main software modules and their relationship to the robot's mechanical and electronic components
- provides the instructions necessary to build, compile, upload, configure and run the software
- includes a clearly visible link to the complete Engineering Documentation.

7.14. The GitHub repository must contain at least three meaningful source-code commits made on different dates during the development process. These commits must reflect distinct

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development stages, additions or improvements and must not consist only of dividing the final source code into separate uploads.

7.15. The version of the source code used during the competition must be clearly identifiable through a release, tag or clearly labelled commit.

Required Documentation Content

7.16. The Engineering Documentation must cover the following areas, where relevant to the team's robot:

- the team's overall approach to the challenge
- mechanical structure and mobility
- object-handling mechanisms
- electrical system, power supply, controllers and sensors
- software architecture and control system
- autonomous navigation, localization and route planning
- detection of the environment and mission-specific objects
- object recognition and classification methods
- mission strategy
- system integration
- testing methods and results
- failures, modifications and improvements
- external hardware, software, libraries, datasets, pretrained models, designs or other resources used by the team.

7.17. The Engineering Documentation must also include:

- a team photograph
- clear photographs of the robot from the front, rear, both sides, top and bottom
- relevant diagrams, drawings or photographs that help explain the robot's mechanical, electrical and software systems
- video evidence of the robot operating autonomously.

7.18. At least one video must be provided for each mission of the team's age group. The part of each video that demonstrates autonomous operation must be at least 30 seconds long. The videos must be publicly accessible or accessible through a direct link without requesting permission.

7.19. Teams are encouraged to make relevant technical files used to manufacture custom robot components publicly accessible. Their availability and completeness are considered when evaluating the reproducibility of the robotic system under Appendix A.

Use of External Resources and Artificial Intelligence

7.20. Teams must identify significant external resources used in developing their robotic systems, including software libraries, publicly available designs, datasets, pretrained models and other relevant technologies. The documentation should explain how these resources are integrated into the team's solution.

7.21. Teams must document any significant use of artificial intelligence tools during the development of their competition solution. This documentation must identify:

- the AI tools used
- the purposes for which they were used
- the parts of the development process or robotic system substantially supported by these tools

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- how the team evaluated, adapted, verified or tested the resulting outputs.

7.22. Routine uses of AI tools, such as grammar correction or translation, do not require documentation.

7.23. The use of AI tools does not, by itself, reduce a team's Engineering Documentation score. Evaluation is based on the team's demonstrated understanding, engineering contribution, design decisions, testing and ability to explain its robotic system.

Submission and Evaluation

7.24. The source code and Engineering Documentation must correspond to the robot presented at the competition.

7.25. For International Events, the link to the team's GitHub repository must be submitted at least twenty (20) days before the start of the event. For national competitions, the submission deadline is determined by the National Organizer.

7.26. Judges evaluate the materials that are publicly available at the submission deadline. Teams may update their source code or Engineering Documentation after the deadline, but later additions may not be considered during the evaluation.

7.27. Missing, inaccessible or password-protected information cannot be evaluated and will receive no points under the corresponding evaluation criterion.

Engineering Documentation Scoring

7.28. The Engineering Documentation has a maximum score of 100 points and contributes 20% to the team's overall competition score.

7.29. The Engineering Documentation is evaluated using five equally weighted criteria:

I. Mechanical Design, Mobility and Manipulation
II. Power, Electronics and Sensor Architecture
III. Software Architecture, Autonomous Navigation and Perception
IV. Systems Integration, Testing and Engineering Decisions
V. Reproducibility, Documentation and Repository Quality

7.30. For each criterion, judges must select one of four evaluation levels:

- **A:** Advanced engineering with strong justification
- **B:** Competent engineering
- **C:** Limited evidence
- **D:** No meaningful evidence

7.31. Intermediate evaluation levels are not permitted. Judges must select the level that best represents the quality, completeness and clarity of the evidence provided.

7.32. The detailed evaluation criteria, scoring descriptors and the percentage assigned to each evaluation level are provided in Appendix A – Engineering Documentation Evaluation Rubric.

8. Competition Elements and Format

Competition Format

8.1. The Future Engineers category consists of two pre-announced missions for each age group, Senior and Advanced. The objectives, field setup, randomization procedures and scoring conditions of these missions are defined in the annual Game Rules.

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8.2. At International Events, the two missions are held on separate competition days:
- **Day 1:** Two official runs of Mission 1, followed by the Secret Mission.
- **Day 2:** Two official runs of Mission 2.

This format applies to both age groups, Senior and Advanced.

8.3. At International Events, participation in Mission 1, Mission 2 and the Secret Mission is mandatory. Each of the two official missions also includes a separate Surprise Rule.

8.4. At national competitions, National Organizers may decide whether to include Surprise Rules and/or a Secret Mission. These additional competition elements are optional at national level. The selected format must be communicated to participating teams in advance.

8.5. The competition organizer determines the detailed tournament schedule, including preparation and practice periods, the number of official runs and the order of team participation, in accordance with these General Rules. National Organizers may adapt the schedule to local circumstances.

8.6. All teams competing in the same age group must be offered the same number of official runs and equivalent competition conditions. The tournament format and schedule must be communicated to participating teams before the competition. Detailed procedures for preparation, practice, robot inspection and official runs are defined in Chapter 9.

Surprise Rules

8.7. Each Surprise Rule is associated with one of the two official missions. At International Events, each age group has two Surprise Rules, one for Mission 1 and another for Mission 2.

8.8. A Surprise Rule may introduce an additional task or modify an existing mission requirement, field setup, scoring condition or game procedure. Its purpose is to challenge teams to adapt their robotic systems and demonstrate flexibility in their engineering solutions.

8.9. Surprise Rules are incorporated into the corresponding mission and its scoring procedure.

8.10. Each Surprise Rule will be announced before the first official practice period of the corresponding mission begins. The announcement will be made simultaneously to all teams in the relevant age group and will include the new requirements, scoring conditions and any necessary instructions.

Secret Mission

8.11. At International Events, the Secret Mission takes place on the first competition day, after both official rounds of Mission 1 have been completed. The Secret Mission is not disclosed to teams before the competition.

8.12. The Secret Mission is designed to evaluate the teams' ability to understand, apply and adapt their engineering solutions to a new robotic challenge within a limited preparation period.

8.13. The Secret Mission objectives, field setup, scoring conditions and official attempt procedures must be communicated simultaneously to all participating teams in the relevant age group when the Secret Mission is announced

8.14. At International Events, teams are given a combined preparation, practice and official attempt period of 180 minutes, beginning immediately after the Secret Mission is announced.

8.15. During this period, teams may perform multiple official Secret Mission attempts. Before each official attempt, the team must inform the judge that the attempt is to be scored.

8.16. Teams may modify, repair, reprogram and recalibrate their robots between attempts. All modifications must comply with the applicable robot regulations.

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8.17. All official Secret Mission results are recorded and retained. The team's best official result is used for the overall competition ranking. The number of attempts depends on the available time and competition field access, following the procedures defined in Chapter 9.

8.18. The Secret Mission has a maximum score of 100 points. The specific tasks and their scoring conditions are announced together with the Secret Mission.

Overall Competition Scoring

8.19. At International Events, the overall competition score consists of four components:

- **Mission 1:** 30%
- **Mission 2:** 30%
- **Secret Mission:** 20%
- **Engineering Documentation:** 20%

The detailed scoring calculations and competition ranking procedures are defined in Chapter 11.

MathWorks Modeling Award

8.20. Teams are free to use any suitable programming and modeling software. Teams wishing to use MATLAB and Simulink can access complimentary software and learning resources provided by MathWorks for WRO participants.

8.21. The MathWorks Modeling Award is presented only at the International Final. It recognizes the effective use of modeling and simulation in the development and testing of robotic systems. Information about the award, including eligibility requirements and the scoring rubric, is available here.

8.22. The MathWorks Modeling Award is evaluated separately and does not affect the Engineering Documentation score defined in Section 7 or the overall Future Engineers competition score.

9. Tournament Procedure

Competition Schedule and Official Runs

9.1. At International Events, the competition takes place over two days, following the schedule defined in Chapter 8.

9.2. Each team is entitled to two official runs of Mission 1 and two official runs of Mission 2. The Secret Mission follows the separate attempt procedure defined in Chapter 8 and this chapter.

9.3. The competition organizer must announce the detailed tournament schedule, including preparation and practice periods, robot inspections, quarantine periods, official runs and the Secret Mission.

Preparation and Practice Periods

9.4. At International Events, the Surprise Rule for each mission is announced on the morning of the corresponding competition day, before the first practice period begins.

9.5. The following competition schedule applies at WRO International Events:

Day 1

- 105 minutes: Mission 1 Surprise Rule announcement and practice.
- 30 minutes: Mission 1, Official Round 1.
- 105 minutes: Mission 1 practice.

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- Scheduled break.
- 30 minutes: Mission 1, Official Round 2.
- 180 minutes: Secret Mission announcement, followed by preparation, practice and banked official attempts.

Day 2

- 105 minutes: Mission 2 Surprise Rule announcement and practice.
- 30 minutes: Mission 2, Official Round 1.
- 135 minutes: Mission 2 practice.
- Scheduled break.
- 30 minutes: Mission 2, Official Round 2.

9.6. During preparation and practice periods, judges will review the teams' Engineering Documentation and may request oral clarifications from team members regarding their robotic systems, engineering decisions and development process.

9.7. All teams in the same age group must receive equivalent preparation time, access to practice facilities and opportunities to discuss their Engineering Documentation with the judges.

Practice on Competition Fields

9.8. During practice periods, teams may test their robots on the designated competition fields. Only one team may use a competition field at a time.

9.9. Teams must follow the practice queue or rotation system established by the competition organizer. All teams must have fair opportunities to access the practice fields.

9.10. Each practice attempt on a competition field may last a maximum of five minutes. After the attempt, the team must leave the field and may return to the practice queue.

9.11. During practice periods, teams may bring laptops and other programming devices to the competition field and communicate with their robot through wired or local wireless connections (e.g., Wi-Fi, Bluetooth or other radio-based communication) for programming, debugging, monitoring and sensor calibration. Internet access is not permitted. All wireless communication functions on the robot must be disabled before robot inspection and quarantine and must remain disabled during official runs.

Robot Inspection and Quarantine

9.12. At the end of each preparation and practice period, teams must stop working on their robots and submit them for inspection within the time specified by the competition organizer.

9.13. Judges inspect the robots for compliance with the applicable technical, dimensional, weight, communication and safety requirements defined in Chapters 5 and 6.

9.14. If a robot does not pass inspection, the judges may allow the team up to three minutes to correct the identified issue. Only one such correction period is permitted before each official run. If the issue cannot be corrected within the allowed time, the robot may not participate in that run.

9.15. Once a robot has passed inspection, it must be switched off and placed in the designated quarantine area.

9.16. While a robot is in quarantine, team members must not access, modify, program, configure, calibrate or otherwise interact with it unless permission is given by a judge.

9.17. Battery charging during quarantine may be permitted in designated charging areas under procedures established by the competition organizer. Any access required for charging must be authorized and supervised by competition officials. No software or configuration changes are permitted during this process.

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Field Setup and Randomization

9.18. After all robots have been placed in quarantine, judges prepare the competition fields and perform the randomization procedures defined in the annual Game Rules.
9.19. The same randomized field setup must be used for all teams competing in the same official round of a mission. A new randomization may be performed before subsequent rounds, according to the annual Game Rules.
9.20. Before each official run, judges must ensure that all game objects are positioned and oriented correctly according to the applicable mission requirements.
9.21. After randomization, teams are not permitted to access their robots or manually enter information about the randomized setup. All information required to complete the mission must be detected and processed autonomously by the robot during the run.

Official Run Procedure

9.22. Teams are called to the competition field according to the official running order. A robot is released from quarantine only when its team is called for its official run.
9.23. The team must bring the robot to the competition field switched off and position it at the designated starting location according to the annual Game Rules and Chapter 6.
9.24. No mechanical, electrical or software adjustments, including sensor calibration or changes to the robot's configuration, may be made after the robot has been released from quarantine and before its official run.
9.25. Before the run begins, the team must be given the opportunity to verify that the competition field has been prepared correctly. Any concerns regarding the field setup must be reported to the judge before the start of the run.
9.26. The official run begins according to the starting procedure defined in Chapter 6. The conditions for ending a run, repairing actions, scoring and verification of results are defined in Chapter 10.
9.27. After completing an official run, the robot must be returned to the designated quarantine or team area, according to the competition schedule.

Secret Mission – Banked Official Attempts

9.28. The Secret Mission uses a combined practice and official attempt format. Teams may continue developing and testing their robots throughout the designated period. The standard quarantine and fixed-round procedures do not apply between Secret Mission attempts.
9.29. Teams may request an official attempt at any time during the designated period, subject to field availability. The team must clearly declare its intention to perform an official attempt before the run begins. Practice attempts cannot be converted into official attempts retrospectively.
9.30. Before each official attempt, the judge must verify that the robot complies with the applicable technical, communication and safety requirements. The competition field must be prepared according to the announced Secret Mission rules. The official starting procedure and the maximum run duration defined in Chapters 6 and 10 apply.
9.31. After each official attempt, the judge records the score and elapsed time according to the scoring procedure defined in Chapter 10. The result remains valid even if the team subsequently modifies its robot or performs additional attempts.

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9.32. Teams may continue practicing and modifying their robots between official attempts. However, once an official attempt has been authorized by the judge, no further adjustments may be made before or during that attempt, except where explicitly permitted by these rules.
9.33. The competition organizer must provide fair access to the competition fields. Each team must be offered the opportunity to perform at least one official attempt. Requests for a team's first official attempt take priority over requests for additional attempts. Further attempts are permitted as time and field availability allow. No new official attempt may begin after the designated period has ended.

10. Robot Attempt and Scoring

Official Run Duration

10.1. Each official run, including Secret Mission attempts, has a maximum duration of three (3) minutes.
10.2. The run begins when the judge gives the start signal and the team starts the robot according to the procedure defined in Chapter 6.
10.3. An official run ends when one of the following conditions is met:
- The maximum run time of three minutes has expired.
- A team member announces that the run has finished by loudly saying "STOP!"
- The robot has completed its mission and come to a final stop, and the team confirms that the run has finished.
- The judge stops the run for safety reasons or another reason explicitly defined in these rules.

10.4. If the maximum time expires while the robot is still operating, the judge instructs the team to stop the robot. Any actions performed after the run has ended do not contribute to the score.
10.5. Teams may end a run before the maximum time has expired, even if the robot has not completed all mission tasks. Points are awarded for successfully completed tasks according to the applicable scoring conditions.

Robot Repairing Actions

10.6. If the robot requires assistance during an official mission run, the team may request permission from the judge to perform a repairing action.
10.7. After permission has been granted, one team member may remove the robot from the game field and repair it outside the field. The run timer continues during the repairing action.
10.8. During a repairing action, the team may repair or restart the robot but must not:
- Modify or replace the robot's program.
- Select a different program or software configuration.
- Change mission parameters or enter information about the randomized field setup.
- Modify the robot's configuration beyond what is necessary to restore its operation.

10.9. Game objects must not be reset or returned to their initial positions during a repairing action. Any game object held or supported by the robot must remain on the field. When necessary, the judge places it as close as possible to its position when the robot was removed. This placement does not itself award any scoring points.
10.10. After the repairing action, the robot must be returned to its original starting position, according to the requirements of the corresponding Game Rules. The team may restart the robot using the starting procedure defined in Chapter 6.

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10.11. Only one repairing action is permitted during each official mission run.
10.12. If a repairing action is performed, the total score achieved during that run is reduced by 50%, regardless of whether the repair was successful.
10.13. If the maximum run time expires during a repairing action, the run ends immediately. The robot may not be restarted, and the score is calculated based on the scoring conditions satisfied before the run ended, including the repair penalty.

Scoring Procedure

10.14. Judges must observe and record scoring conditions that cannot be determined from the final positions of the robot and game objects.
10.15. After an official run has ended, the robot and game objects must remain in their final positions until scoring is completed, unless otherwise instructed by a judge.
10.16. The judge records the score and elapsed time. A team member must verify the result and sign the score sheet together with the judge. Any disagreement must be reported before signing.

11. Competition Ranking

Overall Competition Score

11.1. Teams are ranked separately within their respective age groups, Senior and Advanced.
11.2. The overall competition score is calculated according to the scoring procedures defined in the annual Game Rules, while maintaining the percentage weights established in Chapter 8.
11.3. The best result from each team's official runs in Mission 1 and Mission 2, and from all banked official attempts in the Secret Mission, is used for the overall competition score. When multiple Secret Mission attempts achieve the same highest score, the attempt with the shortest elapsed time is considered the team's best result.

Tie-Breaking Rules

11.4. If two or more teams achieve the same overall competition score, the following criteria are applied in order until the tie is resolved:
1. Higher Secret Mission score.
2. Shorter time in the Secret Mission run
3. Higher score in the best Mission 2 run
4. Shorter time in the best Mission 2 run
5. Higher score in the best Mission 1 run
6. Shorter time in the best Mission 1 run
7. Higher Engineering Documentation score.
8. Higher score in the second-best Mission 2 run
9. Shorter time in the second-best Mission 2 run
10. Higher score in the second-best Mission 1 run
11. Shorter time in the second-best Mission 1 run

11.5. If teams remain tied after applying all the above criteria, they share the same position in the competition ranking.

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Appendix A: Engineering Documentation Requirements

The Engineering Documentation, together with the source code and technical files available through the team's GitHub repository, provides the primary record of the team's engineering work.

It serves four main purposes:

1. To demonstrate the team's engineering process, not only the final robot.
2. To allow judges to evaluate the quality of the team's design decisions, testing and systems thinking.
3. To provide sufficient information for another team to understand and reproduce the robotic system.
4. To contribute to the overall evaluation of the team alongside its performance in the competition missions.

The evaluation is not based on the visual appearance or length of the Engineering Documentation. It is based on:

- the clarity and depth of the engineering reasoning
- the quality of testing and iteration
- the explanation and justification of design decisions
- the integration of the robot's mechanical, electrical and software systems
- the extent to which the robotic system can be understood and reproduced

The same evaluation criteria and scoring rubric apply to both the Senior and Advanced Categories.

A.1. Documentation Evaluation Overview

Judges evaluate the Engineering Documentation and GitHub repository using the following five criteria:

1. Mechanical Design, Mobility and Manipulation
2. Power, Electronics and Sensor Architecture
3. Software Architecture, Autonomous Navigation and Perception
4. Systems Integration, Testing and Engineering Decisions
5. Reproducibility, Documentation and Repository Quality

Each criterion is scored using one of four possible levels:

Evaluation level	Level
Advanced engineering with strong justification	A
Competent engineering	B
Limited evidence	C
No meaningful evidence	D

For the calculation of the final Engineering Documentation score, the evaluation levels correspond to: **A = 20 points, B = 15 points, C = 10 points, D = 0 points** for each criterion.

The maximum Engineering Documentation score is **100 points**.

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Judges may consider evidence presented through:

- written explanations
- photographs
- diagrams and technical drawings
- videos
- source code and code comments
- configuration and model files
- CAD and manufacturing files
- wiring diagrams
- test results and measurements
- version history and GitHub commits
- setup, assembly and operating instructions

Judges evaluate only the materials that are publicly accessible through the submitted GitHub repository and Engineering Documentation at the submission deadline. Later updates may not be considered during the evaluation.

A.2. General Scoring Scale

The following general descriptions apply to all five evaluation criteria. The evaluation levels are cumulative. To receive a given score, the documentation must satisfy the requirements of that level and all lower levels.

20 points: Advanced engineering with strong justification (Level A)

The documentation provides a complete and technically detailed explanation. Important decisions are justified through engineering reasoning, calculations, measurements or test results. Alternatives, constraints and trade-offs are considered. The documentation demonstrates meaningful testing, iteration and improvement.

15 points: Competent engineering (Level B)

The system is clearly and accurately explained. The documentation contains the necessary diagrams, files and technical information and provides some justification for the main design decisions. Another team could understand and reproduce the relevant part of the robot with reasonable effort.

10 points: Limited evidence (Level C)

Some relevant information is provided, but it is incomplete, superficial or weakly justified. The documentation mainly describes what was built, with limited explanation of why it was designed in that way. Important diagrams, files, test results or technical details may be missing.

0 points: No meaningful evidence (Level D)

The required information is missing, irrelevant, inaccessible or too incomplete to be evaluated.

A.3. Detailed Evaluation Criteria

Criterion 1: Mechanical Design, Mobility and Manipulation

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Criterion 1 - Description	Level
No meaningful information about the robot's mechanical design, mobility or manipulation mechanisms is provided.	D
The main mechanical components and mechanisms are shown or described, but design reasoning, dimensions, diagrams, testing or technical details are incomplete.	C
All requirements of Level C are met. In addition, the chassis, drive system, structural design and manipulation mechanisms are clearly explained using photographs, diagrams or dimensioned drawings. The main design choices are described, and another team could reproduce the mechanical system with reasonable effort.	B
All requirements of Level B are met. In addition, the mechanical design, mobility system and manipulation mechanisms are clearly explained and justified. The documentation discusses relevant dimensions, forces, torque, speed, stability, accuracy and other task-specific requirements. Alternatives and trade-offs are considered. Testing and iterations that improved mobility, manipulation accuracy or reliability are presented.	A

What is evaluated

- chassis and structural design
- drive and turning system
- robot dimensions and use of the available operating space
- mechanical stability and rigidity
- speed and torque considerations
- mechanisms for interacting with or manipulating objects
- reach, positioning and alignment with relevant objects or field elements
- positioning and task-execution accuracy
- material and component selection
- mechanical testing and improvement.

What evaluators are looking for

- Evidence that the team understands how mechanical design affects navigation and mission performance.
- Clear explanation of why the selected drive and manipulation solutions were chosen.
- Evidence that the team tested and improved the mechanical design.
- Consideration of the relationship between robot dimensions, manoeuvrability and access to relevant areas of the competition field.

Criterion 2: Power, Electronics and Sensor Architecture

Criterion 2 - Description	Level
No meaningful information about the power system, electronics or sensors is provided.	D
Batteries, controllers and sensors are listed, but diagrams, calibration details, power reasoning or meaningful justification are incomplete.	C

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All requirements of Level C are met. In addition, a clear wiring or system diagram is provided. The power supply, controllers, electronic interfaces and sensors are explained. Sensor selection and placement are described, and the electronic system can be reproduced with reasonable effort.	B
All requirements of Level B are met. In addition, the documentation presents and justifies the complete power, electronic and sensor architecture. It includes power-consumption reasoning, sensor trade-offs, justified sensor placement, calibration methods and consideration of possible electrical or sensing failure modes. Testing or iteration used to improve reliability is demonstrated.	A

What is evaluated

- power-system architecture
- battery selection
- voltage regulation and power distribution
- expected or measured current consumption
- controllers and onboard computers
- electronic interfaces and communication between components
- sensor selection and placement
- sensor coverage and field of view
- calibration methods
- wiring and system diagrams
- electrical and sensor reliability

What evaluators are looking for

- Evidence that the team planned the power system instead of only connecting components.
- Justification for sensor choices and positions.
- Understanding of sensor limitations.
- Consideration of noise, lighting, reflections, interference, blind areas or similar issues.
- Evidence that calibration and testing were used to improve reliability

Criterion 3: Software Architecture, Autonomous Navigation and Perception

Criterion 3 - Description	Level
Source code is provided without a meaningful explanation, or the robot's autonomous strategy cannot be understood from the documentation.	D
A basic description of the software and autonomous behaviour is provided, but the program structure, algorithms, mission logic or testing process is incomplete or unclear.	C
All requirements of Level C are met. In addition, a flowchart, state machine or software architecture diagram is provided. The main modules and functions are clearly explained. The robot's navigation, perception and mission strategy can be understood and reproduced.	B

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All requirements of Level B are met. In addition, the software architecture and autonomous strategy are clearly structured and justified. Algorithms for control, localization, mapping, navigation, route planning, perception or manipulation are explained. Relevant edge cases and recovery behaviours are considered. The documentation describes testing and tuning methods, including suitable performance metrics.	A

What is evaluated

- software structure and modularity
- control flow, state machines or behaviour trees
- motion and manipulation control
- localization and mapping methods
- path planning and route replanning
- detection of mission-relevant objects, obstacles and field features
- detection and handling of blocked paths, where applicable
- interpretation of mission-specific information
- object recognition and classification, where applicable
- handling of edge cases and unexpected situations
- software testing, tuning and performance measurement
- source-code comments and technical explanations

What evaluators are looking for

- Understanding of how the software structure supports the robot's behaviour.
- Clear explanation of how the robot obtains and processes information from the field.
- Clear mission strategy and task sequence.
- Evidence of testing and tuning rather than only presentation of the final code.
- Appropriate consideration of cases in which detection, localization, navigation or manipulation may fail

Criterion 4: Systems Integration, Testing and Engineering Decisions

Criterion 4 - Description	Level
The documentation describes only the final robot and does not provide meaningful evidence of testing, integration or engineering decision-making.	D
Some decisions, tests or modifications are described, but the reasoning is incomplete or superficial. The relationship between the robot's subsystems is not clearly explained.	C
All requirements of Level C are met. In addition, the main subsystems and their interactions are clearly explained. Relevant constraints, tests, design changes and engineering decisions are presented, although some analysis or justification may be limited.	B
All requirements of Level B are met. In addition, the robot is presented as one integrated engineering system. Important constraints, alternatives and trade-offs are clearly identified. Decisions are supported by measurements, calculations or test	A

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results. Iteration cycles, risks and failure modes are discussed together with corrective or mitigation actions.	

What is evaluated

- interaction between mechanical, electrical and software systems
- engineering constraints
- alternative solutions and trade-offs
- testing methods and performance measures
- development iterations
- identified problems and failures
- risk identification
- corrective and mitigation actions
- evidence-based engineering decisions
- development process followed by the team

What evaluators are looking for

- Evidence that the team considered the robot as a complete system rather than as separate components.
- Clear explanations of why one solution was chosen instead of another.
- Decisions made under constraints such as space, weight, power, processing capacity, accuracy, time or reliability.
- Test results that influenced the final design.
- Evidence that failures and unsuccessful approaches contributed to improvement

Criterion 5: Reproducibility, Documentation and Repository Quality

Criterion 5 - Description	Level
The Engineering Documentation or GitHub repository is missing, inaccessible, broken or too incomplete for meaningful evaluation.	D
The documentation and repository exist, but their structure is unclear or important files, links, explanations or instructions are missing. Reproducibility is limited.	C
All requirements of Level C are met. In addition, the Engineering Documentation and GitHub repository contain the essential code, technical files, diagrams and instructions. The structure is clear, the required commits are present, and another team could reproduce the robot with reasonable effort.	B
All requirements of Level B are met. In addition, the complete robotic system can be reproduced from the Engineering Documentation and GitHub repository with minimal additional information. The documentation and repository are clearly structured and easy to navigate. All relevant code, configuration files, technical diagrams and manufacturing files are included. The repository has meaningful commits, clear setup instructions and an identifiable competition version.	A

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What is evaluated

- organization and clarity of the Engineering Documentation
- GitHub repository structure
- README content and navigation
- source-code completeness
- meaningful commit history
- identification of the competition version
- configuration files and model files
- CAD and manufacturing files, where applicable
- wiring and system diagrams
- software setup and operating instructions
- assembly instructions, where relevant
- photographs and mission videos
- identification of external resources
- reproducibility of the complete robotic system.

What evaluators are looking for

- Professional, clear and usable technical documentation.
- Evidence that the submitted materials represent the development process and not only a final upload.
- Clear links between the Engineering Documentation, source code and technical files.
- Sufficient information for another team to understand, build and operate a similar robotic system.
- Working links and publicly accessible files.

A.4. Compact Rubric Overview

The table below summarizes the cumulative progression between evaluation levels. Each higher level includes the requirements of all lower levels, as defined in Section A.3.

Criterion	Level: D	Level: C	Level: B	Level: A
Mechanical Design, Mobility and Manipulation	No meaningful mechanical information	Basic description with limited reasoning or diagrams	Clear and reproducible mechanical and manipulation design	Justified design, trade-offs, calculations, testing and iteration
Power, Electronics and Sensor Architecture	No meaningful power, electronic or sensor information	Mainly component lists	Clear diagrams, sensor placement and reproducible architecture	Power reasoning, sensor trade-offs, calibration, failure analysis and iteration
Software Architecture, Autonomous Navigation and Perception	No meaningful explanation of software or strategy	Basic software and mission description	Clear architecture, modules and reproducible autonomous strategy	Justified algorithms, edge cases, testing, tuning and performance metrics

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Systems Integration, Testing and Engineering Decisions	No visible engineering process	Some incomplete reasoning or testing	Subsystems, decisions and tests are clearly explained	Constraints, trade-offs, iterations, risks and evidence-based decisions
Reproducibility, Documentation and Repository Quality	Missing or unusable materials	Poor structure or missing files	Clear documentation and essential files. Reasonably reproducible	Fully reproducible, well organized, versioned and professionally documented

A.5. Suggested Evaluation Workflow

The following process is recommended for evaluating each team:

1. Open the team's GitHub repository.
2. Locate the README and the link to the complete Engineering Documentation.
3. Confirm that all required links and files are publicly accessible.
4. Review the Engineering Documentation and repository to locate evidence related to each of the five criteria.
5. Compare the available evidence with the descriptors for A, B, C and D levels.
6. Select one score for each criterion based only on the available evidence.
7. Record the score and a short explanatory comment for each criterion.
8. Add the five criterion scores to determine the final Engineering Documentation score out of 100 points.

Language quality must not affect the score unless it prevents judges from understanding the team's engineering work.

A.6. Team Checklist

Before submitting, teams should confirm that:

- the GitHub repository is public and the link to the complete Engineering Documentation is clearly visible
- all documentation, video and downloadable-file links work without requesting permission or entering a password
- the submitted materials correspond to the robot presented at the competition
- the mechanical design, mobility and manipulation mechanisms are clearly explained
- the power system, electronics, sensors and wiring are documented
- the software architecture, autonomous navigation and perception methods are explained
- important engineering decisions, tests, failures and improvements are included
- the repository contains the complete source code and the instructions required to run it
- at least three meaningful commits are present, and the competition version is clearly identified
- the photographs, mission videos and relevant technical files required by Section 7 are included
- another team could understand and reproduce the robotic system using the submitted materials

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