IEEE REGION 8

MALTA

RULES & REGULATIONS

Robot Championship 2022 - IEEE R8 - Rules & Regulations - Not final VERSION 2022 Apr v3

THIS VERSION IS NOT FINAL AND IS A GUIDE. THE FINAL VERSION WILL BE UPDATED ONCE ALL APPLICANTS ARE RECEIVED AFTER THE DEADLINE

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1. GENERAL REMARKS

1.1. Only valid applications will be considered to be selected for participation. The deadline for applications is by the end of the day of the 1st of June, 2022 (CET timezone). All the applications must be made using the Google form publicly available. No later submissions nor submissions done through any other channel(s) will be considered.

1.2. There is a limit of twenty-five (25) teams for this championship. If the total number of eligible applications exceeds that limit, a selection process will be made. This selection will consider the diversity of sections participating, the team's motivation, and the funding.

1.3. The hosting country can have upto two participants competing in the championship.

1.4. After being accepted, each team must apply for at least two STEM activities. This application must be made using the online form informed, and no other means of application will be accepted.

1.5. IEEE Region 8 may fund applications on a limited type of expenses, such as accommodation expenses. A motivation for this funding must be written in the application form's proposal file. This fund is limited and will be assigned to teams depending on several factors (non-exhaustive list, in a non-relevant order): (1) the income level of the team's country of origin, (2) the resources available at the team's local section level. Clear criteria will be established and defined by the organisation committee.

1.6. In case of acceptance to participate in the championship, all team members must be physically at the event during its entire duration — no partial participation of any member will be accepted. Furthermore, each team is fully responsible for all the funding (except specific funding obtained from Region 8). No charging can be done to IEEE Region 8 or any other event organisers in the future. This is mandatory, and non-complying teams will be penalised.

2. TEAMS & ROBOT CLASSES

2.1. Every team will participate in the Featherweight category where each robot is allowed to weigh up to 20 kg.

2.2. Each team must consist of up to three (3) members (plus one mentor), each bound to that one team and robot. No participant can be part of more than one team.

2.3. Competitors must be current student members of a student branch within Region 8, or past students having finished their studies in the previous scholastic year and still members of the student branch.

3. GENERAL CONSTRUCTION

3.1. A maximum voltage of **24V DC** is allowed for powering the robot's drive and add-on systems.

3.2. The fitting of interchangeable body panels or alternative add-ons is allowed between games.

3.3. Any onboard equipment that could require maintenance between games, such as the recharging of compressed gas cylinders or batteries, should be easily and quickly accessible. The robot should be fully serviceable within a reasonable amount of time to participate in the planned competitions.

3.4. All compressed gas cylinders must be controlled. Such cylinders, provided by the competitors, will be stored at room temperature, then tested and vented if necessary to **1000 psi**.

3.5. Each robot must have a number of **active** and **effective** add-ons within the rules of the competition.

3.5.1. An active add-on is defined as an actuated device intended to enhance the robot, in addition to or independent of the robot train drive such as Flipper, Spinner, Lifters etc.

3.5.2. An effective add-on is one which effectively enhances the capabilities of the robot Such as fixed ramps, tow bars, fork bars etc.

3.6. Essential spare parts must be made available on the day of the competition.

3.7. **GENERAL BUILD AND FUNCTION**

3.7.1. Robots can be built using wheels, tracks or legs ("walkers"). No flying robots (or parts of them) will be accepted in the championship (e.g., drones are not allowed).

3.7.2. Other styles and methods may be considered, but participants are required to contact the organisers before commencing construction.

3.7.3. "Cluster Bots", i.e., robots consisting of two or more components, are allowed. They must enter the arena as a single object, and if 50% or more of the robot is immobilised, the robot will be deemed to have lost that particular battle.

4. WEIGHT & DIMENSIONS

4.1. **WEIGHT**

4.1.1. The maximum weight is as defined in Section 2.1.

4.1.2. If interchangeable add-ons are used, the final weight is measured with the heaviest setup.

4.2. DIMENSIONS

4.2.1. The base/floor dimensions (length x breadth) of the robot must not exceed **80cm x 80cm**.

4.2.2. After every duel, the robot is expected to be able to retract itself to its initial status/position/setup (including dimensions), if these have been altered during the fight. Failure to do so will result in the robot losing the match.

4.2.3. There is a vertical maximum height restriction of 150 centimetres.

5. MOTIVE POWER

5.1. GENERAL

5.1.1. Motive power for the drive and/or add-ons may be **electric, hydraulic or pneumatic**.

5.1.2. A combination of engines, such as electric drives, pneumatic and/or hydraulic pumps is allowed.

5.1.3. Other types of engines may be considered, but participants are required to contact the organisers prior to construction.

5.2. SAFETY

5.2.1. Proper activation and deactivation of robots is critical. Robots must only be activated in the arena, testing areas, or with the express consent of the event organisers or the safety officials.

5.2.2. All robots must be fitted with a **cut-off/kill switch** which fully deactivates all of the robot's subsystems, including drive, add-ons and communications, in less than sixty (60) seconds by a manual disconnect. If there is more than one isolating switch, these must be positioned adjacent to one another.

5.2.3. The kill switch must be positioned in a visible part of the robot's bodywork and away from any operating add-ons or drive. This position must be clearly marked and accessible at all times.

5.2.4. The switch/link may be fitted under a cover, provided that the cover can be quickly opened without the use of tools and is clearly marked.

5.2.5. If the proposed robot design might fail to conform to any safety regulations, contact the organisers before commencing any work.

5.3. ELECTRIC

5.3.1. The maximum voltage is as defined in Section 3. The utilised voltage must be declared on the **technical check sheet** before the tournament commences.

5.3.2. All power connections, i.e. connections carrying a heavy current, must be of an adequate grade and be properly insulated. Cables must be routed to minimise the chances of being cut.

5.3.3. Batteries must be completely sealed and not contain free-flowing liquid, whether electrolyte or otherwise.

5.3.4. Battery connections must be adequately insulated.

5.4. HYDRAULIC

5.4.1. Hydraulic pressure is limited to **3000 psi**. The competitor must be able to demonstrate the pressure used and carry with them a portable pressure gauge that can be fitted to the system if required to do so by the organising team.

5.4.2. The use of accumulators on the hydraulic circuits is strictly prohibited.

5.4.3. Hydraulic fluid storage tanks must be of a suitable material.

5.4.4. Hydraulic fluid lines and fittings must conform to **British Standards (BS)** specifications. The lines must be routed to minimise the chances of being cut.

5.5. PNEUMATIC

5.5.1. Pneumatic pressure is limited to **1000 psi**. The competitor must be able to demonstrate the pressure used and carry with them a portable pressure gauge that can be fitted to the system if required to do so by the organising team.

5.5.2. Compressed gas cylinders must conform to current **HSE** specifications only. Only the following cylinders, or multiples thereof, are allowed.

Capacity (kg)	**Material**
1.1	Steel
1.1	Aluminium
2.0	Aluminium

5.5.2.1. These compressed gas cylinders must have been examined by a competent person in the past five years and have a **valid test certificate**, stamped with the date of the test and the brand of the person who carried out the inspection.

5.5.2.2. If, upon inspection, we deem that the construction or valve has been altered or tampered with in any way, the robot will be disqualified. Valves must be fitted using the torque values specified in **BS 5430**.

5.5.3. Pneumatic lines and fittings must conform to **BS EN983** or **ISO4414**. The lines must be routed to minimise the chances of being cut.

5.5.4. All gases in pneumatic systems must be **inert**. Examples include carbon dioxide (CO_2), argon (Ar) and nitrogen (N_2).

5.5.4.1. CO_2 can only be considered inert when dry, hence under no circumstances must moisture be allowed to enter a CO_2 cylinder except under the supervision of a competent person with knowledge of the correct drying procedures.

5.5.5. SAFETY

5.5.5.1. All compressed gas cylinders and valves/regulators must be contained within the body of the robot to shield them from punctures.

5.5.5.2. The compressed gas cylinder must be securely fastened down. Unless adequately protected by the bodywork, the valve/regulator must have an adequate **strap** or **cage** over it.

5.5.5.3. A **pressure relief/safety valve** must be fitted on the high pressure side of the circuit and set to lift at **1000 psi**. CO_2 cylinders must also be protected by a **burst disc**, set to rupture if the pressure within the cylinder reaches **2700 psi/190 bars**.

6. ADD-ONS

6.1. All pyrotechnics, explosives, flames, firearms, liquids, corrosives and electronic devices such as radio jammers and heat guns are strictly prohibited.

6.2. Devices using inflammable or combustion-supporting gases are prohibited.

6.3. Untethered projectiles are not allowed.

6.3.1. If tethered projectiles are used, the tether may not exceed **1.5 m** in length. This is measured from the centre of the robot to the tip of the projectile.

6.4. Rotating hardened steel blades that may shatter are not allowed. Discuss the blade grade with the organising committee prior to installation.

6.5. Any blades, such as bayonets, must not exceed **15 cm** in length.

6.6. Adequate protection must be fitted at all times on any add-ons with sharp edges and other hazardous parts of the robot(s) except when the robot is in the arena. This protection would not be considered as part of the final overall weight of the robot.

6.7. Any moving or swinging arms, regardless of whether they hold sharp and/or rotating add-ons, must be fitted with a visible **locking pin** to show that the arm(s) is/are securely locked in place.

6.7.1. Locking pins must be painted **red** or have a **red tag** attached and must be in place at all times, except in the arena. These locking pins do not contribute to the overall weight of the robot.

6.8. Self-contained add-ons must have a secondary restraint fitted in the event of the primary fitting breaking away.

6.9. Autonomous add-ons are allowed, although strict safety procedures must be incorporated. Discussing such designs with the organisers is strongly recommended.

7. RADIO CONTROL

7.1. All robots must be controlled wirelessly from outside the arena.

7.2. **All the RC circuits, which can either be purchased or built, must have its frequency declared**. In order to do this, all registered competitors will be invited to join a Google/ Facebook group named “IEEE R8 Robot Championship 2022” after the final registration deadline to communicate this information to all participants. It is up to each team to ensure that there are no duplicate frequencies. Teams are encouraged to use **2.4 or 5.0 GHz** technology rather than FM in order to avoid interference with other teams’ radios and external sources.

7.3. Frequencies are allocated on a first come first served basis.

8. GENERAL SAFETY

8.1. Robots will be inspected for safety, reliability and conformity to these rules and regulations before being allowed to compete.

8.2. It is always advisable to consult with the organisers before developing potentially controversial systems. Failing to do so, may result in disqualification and banning from the championship as per organisers decision

9. COMPETITION STRUCTURE

This section is subject to change as the date of the event approaches. The general layout of the competition will be maintained.

9.1. The competition structure will be defined once the number of competitors is finalised. This ensures that an adequate competition structure is chosen for the number of robots.

9.2. The championship is first divided into two major parts: (1) Qualifying phase (2) Knockout phase.

9.3. For the Qualifying phase, the robot pairing is done by a randomised and transparent ballot in front of the audience on the day(s) of the competition. Following each game the leaderboard is updated accordingly.

9.4. During the first phase, for each game the winning robot is awarded three (3) points, whilst the losing robot is awarded zero (0) points. In the event of a time elapse the winning robot will be awarded two (2) points, whilst the losing robot is allocated one (1) point. These points determine the robots' standing/order in the leaderboard.

9.5. The Qualifying phase will involve "Time to Fall" and possibly other games from Section 14. The specific games for this phase will be defined once the number of registered teams is verified.

9.6. Finished the first phase, the second one took place. The pairing of robots for the knockout phase will be determined based on the performance in the qualifying phase. The robots will be ordered from best to worst and matched as such. *E.g., First place qualifier Vs Last place Qualifier. 2nd Best Qualifier Vs 2nd Last Qualifier and so on.*

9.7. The Knockout phase starts with the "Weight Game." For every two robots facing each other, one winner will be drawn and moves on to the next game. Details for this game are stated in Section 14.

9.8. The next game is "Death Clock," described in Section 14. Its winner will move on to the final match. The loser will be matched to elect the 3rd and 4th places.

9.9. The final game is "Hanging Hazard" and is described in Section 14. Its winner will be awarded 1st place, and the loser the 2nd.

9.10. An illustration for the Knockout phase (points 9.7 to 9.9) is presented in Figure 1.

9.11. The timings and end conditions of each game are described in Section 14.

9.12. For every game, no competitor is allowed to touch/modify the respective robot until the end of that game.

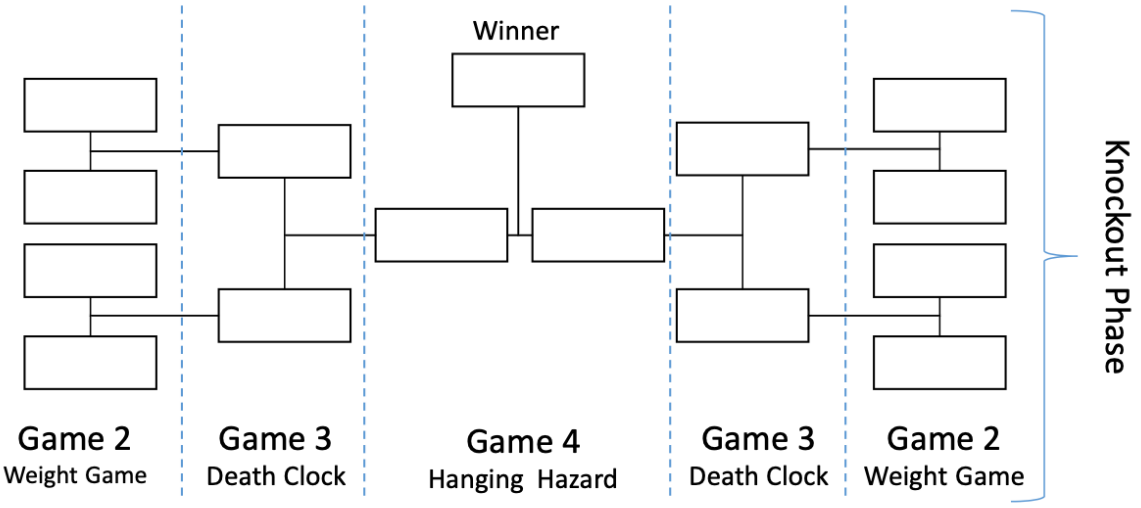

Figure 1 - Illustration for the Knockout phase.

10. MAINTENANCE WORKSHOP (PIT AREA)

10.1. Power tools are permitted on the day(s) of the event. Care must be taken not to damage any property. Any damage done to the premises will have to be paid for by the offending team.

10.2. No welding equipment is allowed on the premises.

10.3. Only repairs may be carried out in the workshop. Modifications to the robot are prohibited after the final technical checkup.

10.4. A staff member will notify teams ten (10) minutes prior to their fight so that any repairs and adjustment can be safely finalised. If a team does not approach the arena in time, the jury is empowered to disqualify the team for that game.

10.5. A maximum of three (3) persons per team is allowed in the maintenance workshop.

11. 'MAKING OF' MATERIAL

11.1. Each team must submit a **'making of' video** of the robot two weeks prior to the actual competition. These videos will be used to promote the competing robots in between games. **Submission of the video is COMPULSORY**. Failure to produce such material will result in a subtraction of points for the team in the Qualifying phase.

11.2. The video must include a background of the team members as well as the specifications of the robot to be submitted.

11.3. The video must be at least three (3) minutes and not longer than ten (10) minutes long.

11.4. Each individual video will have points allocated to it as deliberated by the organising committee.

12. SUBMISSION DETAILS

12.1. The competitors will be asked to hand in their robots at a specified date before the competition, generally one day prior to the competition itself. No robot will be allowed to participate if not delivered by this date irrespective of the reason produced.

12.2. When handing the robot to the organisation (cf. point 12.1 above), robots will be measured and weighed to make sure they abide by the rules. An inventory sheet will be prepared by the organisation and delivered for completion to each team in order to list any additional items the robot will use during the event. Examples for these items are extra body panels, add-ons and batteries. Participants will only be allowed to use the items declared on this day during the competition. This inventory sheet must be filled and submitted to the organisation at least one day prior to the competition start.

12.3. Competitors will also be requested to display the robot in operation to the organisers, subsequent to which competitors will only be allowed to remove batteries for charging. The batteries will be marked by an IEEE official in order to ensure that no other batteries are used during the event. Following this, the robot shall be held in the possession of the organisation until the day of the tournament, preferably in a locked up sports bag or any other contraption.

13. DISCLAIMER

13.1. The IEEE Region 8 (henceforth referred to as “we”) reserves the right at any time and at our sole discretion, to make any changes to the rules and regulations without prior notice.

13.2. We reserve the right to disqualify any robot that, in our sole opinion, is likely to damage the premises or compromise the safety of any personnel, contestants and members of the general public.

13.3. In order for the Robot Championship to be held, at least ten (10) teams must register. Should one or more teams drop out after the registration period, the championship will still take place provided that at least six teams (6) submit a functioning robot for that particular category on the submission date.

14. GAME TYPES

14.1. TIME TO FALL

14.1.1. This game can be used to qualify robots for the Knockout phase of the championship.

14.1.2. The robots winning one match stand a higher chance to be qualified.

14.1.3. OBJECTIVE: To pull the opponent off the edge as soon as possible.

14.1.4. RULES:

14.1.4.1. Players start the game tied to each other and equidistant from a pit/fall.

14.1.4.2. When the game starts, a timer begins. Both players need to try to pull their opponents off over the edge. The player that succeeds wins the match.

14.1.4.3. As soon as a player falls, the timer stops.

14.1.4.4. No add-ons (cf. Section 3.1) are allowed to be used in this game.

14.1.4.5. The game ends whenever one of these criteria is met:

14.1.4.5.1. X minutes since the start (to be defined after the full championship is drawn — this will be informed prior to the event), or

14.1.4.5.2. Whenever a player manages to pull the opponent off the edge.

14.2. WEIGHT GAME

14.2.1. OBJECTIVE: A red/blue player scores red/blue weights, respectively, by dragging and dropping them in their respective corner pits.

14.2.2. POINTS: Each weight corresponds to its respective point value.
E.g., 20 Kg is 20 points, and 1.25 Kg is 1.25 points.(The exact weight sets for the game will be defined closer to the event).

14.2.3. RULES:

14.2.3.1. Both players start the game in their respective colour corners.

14.2.3.2. Pushing/minor physical contact with the opponent is allowed.

14.2.3.3. The usage of active add-ons are ONLY allowed to be used on the weights.

14.2.3.4. If a player scores the opposing player's weights in their corner, those points will be considered negative points.
E.g., the blue player has already earned 20 points but then dragged the 5 points red weight in their blue corner — now the blue player has 15 points (20 - 5).

14.2.3.5. If a player manages to score ALL the available weights in time (refer to point 14.2.3.8 below), they can move on to attempt to drop their opponent in their pit for 100 points or in the opposing pit for 0 points, and the game ends. At this stage, the use of active add-ons on the opponent is now allowed.
E.g., the blue player scores all the blue weights. If there is still available time, the blue player can attempt to push the red player into the blue pit for 100 points or into the red pit for 0 points.

14.2.3.6. If a player drops their opponent in any pit before scoring all their available points first, this player scores 0 points, and the dropped opponent scores 100 points.

14.2.3.7. If a player falls in any pit on their own, the opponent scores 50 points, and the game ends.

14.2.3.8. The game ends either after one of the players falls into the pit, or after X minutes since the start (to be defined after the full championship is drawn — this will be informed prior to the event). The player with the most points scored wins the match.

14.3. DEATH CLOCK

14.3.1. OBJECTIVE: to control random areas until the opponent's Death Clock runs out of time.

14.3.2. RULES:

14.3.2.1. Both players start the game in their respective colour corners.

14.3.2.2. Both players need to compete to control the active area at the time. A player controls the area while having most of their robot inside the circle. This state (most of the robot inside, or not) will be defined by a referee assigned to that task.
E.g., the red player is currently controlling the area as most of the robot is within the yellow circle. The blue player does not control the area even though some of the robot is in the area and the majority is out.

14.3.2.3. If both the robots cover the area, the robot most within the area controls it.

14.3.2.4. As soon as a player controls the area, a referee triggers the timer on the opponent's Death Clock, counting downward. When neither opponent controls the area, both players' clocks freeze. The referee triggers the respective Death Clock once a player controls the area again.

14.3.2.5. The active area will change periodically between a number of predefined areas. Some sort of notification will take place to signify that the active area changed. The new active area will be called out/highlighted in a manner that is described later closer to date.

14.3.2.6. Controlling an area that is not active will not affect the Death Clock in any way.

14.3.2.7. The game ends whenever one of these criteria is met:

14.3.2.7.1. X minutes since the start (to be defined after the full championship is drawn — this will be informed prior to the event), or

14.3.2.7.2. Any participant's Death Clock runs out of time.

14.3.2.8. If the game ends and no Death Clock would have run out, the player with the most time remaining on their clock wins the match.

14.3.2.9. All effective and active add-ons (cf. Section 3.1) are allowed in this game.

14.3.2.10. The pits are both closed for this game.

14.4. HANGING HAZARD

14.4.1. OBJECTIVE: to move the *Gömböks* (https://en.wikipedia.org/wiki/Gömböc) to a defined pit.

14.4.2. RULES:

14.4.2.1. Both players start the game in their respective colour corners.

14.4.2.2. When the game starts, several *Gömböks* are dropped in the arena, one at a time.

14.4.2.3. There will be hanging weights above the arena. These act as an arena hazard for both robots.

14.4.2.4. All effective and active add-ons (cf. Section 3.5) are allowed in this game.

14.4.2.5. The pits are both replaced with goals/pockets for this game.

14.4.2.6. The game ends whenever one of these criterion is met:

14.4.2.6.1. X minutes since the start (to be defined after the full championship is drawn — this will be informed prior to the event), or

14.4.2.6.2. If a player manages to score a predefined number of *Gömböks* to the opposing area.