

RobotChallenge - Remote AirRace Rule

Short Description: The robot is in the remote control state, flying robots have to complete figure 8's around two poles that are several meters apart, two fixed circles will be installed between the two poles. The robots have to demonstrate their ability to maneuver quickly and accurately in three dimensions, the robot successfully completed the 10 circle flight, and the shortest time team won.

Group:

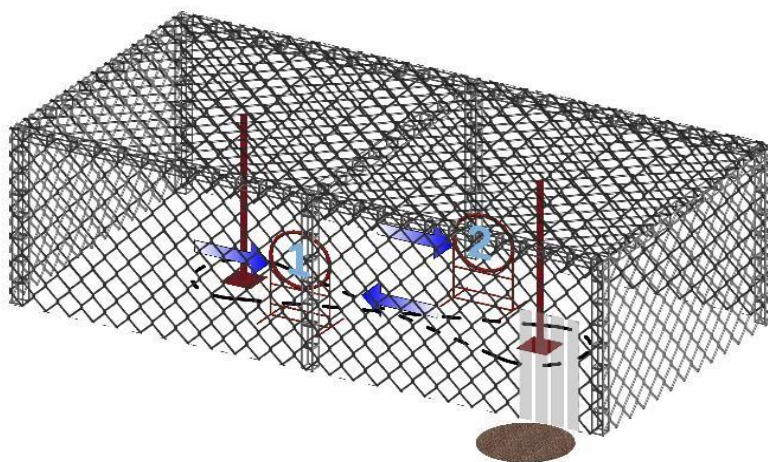
Senior

Adult

1. General Requirements

1.1. Field Dimensions

- A. The field is at least 10 m long, 5 m wide and 3 m high. It is covered by a safety net. Two orange poles are placed in the field at least 5 m apart. The poles are 3 m high and have a diameter of 11 cm. There is guaranteed free space of 2 m around the poles.
- B. The center of the two poles, like the intersection of the dotted line, will place two circles with a diameter of 1-1.2 meters, the bottom of the circle is 0.5 meters -1 meters.
- C. As shown in the chart, Spot 1 and Spot 2 are obstacles of the Remote Air Race. The robot shall first cross Spot 1 and then Spot 2, and finish the designated line by flying in the shape of "8." The size of the obstacle will be announced on site. The 2 Spots are parallel.
- D. The below is a schematic diagram of the circle obstacle at Spot 1 and Spot 2:





2. Requirements for Robots

2.1. General Robot Specifications

- A. The robot must be an aerial vehicle, which is able to fly in a height of 1-2 m.
- B. Aerial vehicles include fixed-wing aircraft, rotary-wing aircraft (helicopter, multicopter), flapping-wing, or airship designs.
- C. The total weight of fixed-wing aircraft must not exceed 0.5 kg, helicopters must not exceed 1 kg, and all other designs must not exceed 2 kg.
- D. A maximum speed of 10 m/s must not be exceeded.
- E. All other robot designs must fit within a cube of 1 m side length.

2.2. Class Specifications

- A. Robots must be remote-controlled, and any remote controller can be used.
- B. Navigational aids shall be removed residue-freely within two minutes after the flight time.

2.3. Security and Safety

- A. Failure to comply with the security and safety rules, will lead to disqualification of the team and grounding of all the team's robots for the remainder of the event.
- B. Equipment and operations must comply with the Austrian law.
- C. Only electric propulsion robots are allowed to participate in the competitions.
- D. The robot must be clearly identified with the starting number as obtained during the registration.
- E. Robots may not have sharp or potentially dangerous parts, excluding normal propellers and helicopter-blades.
- F. Only non-flammable gases may be used for the buoyancy body.
- G. A human safety pilot must be able to take over control of the robot at any time in case of an emergency.
- H. Entrance to the flight area is only permitted for one team member of the scheduled team after clearance by the judge.
- I. Teams must always follow the instructions of the judge.
- J. The judge can abort every flight.

2.4. Homologation

- A. All participating robots are allowed to compete only after passing the homologation. This check will be performed before the first flight and covers all points listed below.
- B. The robot must show its ability to remain at a flying height of 1 - 2 m without human intervention regarding the height (lateral control is allowed).
- C. The ability to safely control the robot has to be shown by the team member who will operate the robot during the competition (robot operator).
- D. The robots must comply with all security and safety requirements.



3. Game

3.1. Aim of the Game

- A. The robot starts off remotely, and the robot continues to fly around eight characters and 10 circles, the circle is 1-1.2 meters in diameter. It needs to go through 2 circles per cycle, and the shortest time team wins.
- B. During the flight the robot has to remain mainly within the flying height of 1 - 2 m above the ground.

3.2. Start of the Game

- A. Each team is allocated a preparation time slot of 5 minutes. During the preparation time one team member (robot operator) is allowed to enter the race area in order to prepare for the start.
- B. When preparation is finished or the 5 minutes preparation time is over the judge starts the 10 minutes flight time and the robot operator can start the robot.
- C. The start has to be performed at the starting line.
- D. During the flight the robot operator has to leave the race area for safety reasons.

3.3. Restart

- A. A flight ends when the robot touches the ground or the safety net or the robot operator decides to abort the flight.
- B. Multiple starts are allowed during the flying time. The robot operator may reenter the race area after the judge's clearance and restart the robot.
- C. During the flight the robot operator has to leave the race area for safety reasons.

3.4. End of the Game

- A. When the robot completes 10 circles of effective flight, or when the referee stops the game, the game ends.
- B. The game time is limited to 10 minutes, if it fails to complete 10 consecutive circles in 10 minutes, the time will be awarded 10 minutes.

4. Scoring

- A. The robot has to fly figure 8's around the two poles in the correct way as shown in Fig.1 , and pass through 2 circles in sequence. To complete 10 cycles of effective flight (to reach the altitude of the flight, complete the trajectory of the designated route, do not appear on the ground and other conditions), landing at the starting point, the end of the time.
- B. Valid start: The robot starts from the starting point upon the whistle of the judge. The robot outside the fixed-wing aircraft should first be elevated to a height of 1m to 2m above the ground. Then, the robot should move ahead in the shape of "8." Otherwise, the judge has the right to require a relaunch, but the timing will not be stopped for that.
- C. Valid flight:



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- a) After a valid start of the robot, the robot should fly at a height of 1m to 2m during the flight process;
- b) During the flight process, the robot should not touch the net or the ground;
- c) The robot should fly in the designated route and cross two round circles.
- D. The robot starts from the starting point to finish 10 circles of valid flights continuously, and then successfully lands on the starting point. The timing of the one round is taken as the valid score.
- E. The starting point for the robot is a 1.2m*1.2m rectangular square. If the robot lands on outside the designated area or any part of the robot is vertically projected to cover the rectangular square, the robot will be fined for 20 seconds.
- F. If the robot fails to finish the task in 10 minutes, the score of the robot will be invalid.

5. Notices

During the competition process, the robot can exchange its battery, but the timing will not be stopped therefore. However, if the competition has been going on for ten minutes, the competition will directly come to an end.

6. Declaring Objections

6.1. Declaring Objections

- A. There is no objection to the referee's verdict.
- B. The lead person of a team can present objections to the Committee, before the match is over, if there are any doubts in the exercising of these rules. If there are no Committee members present, the objection can be presented to the judge before the match is over.

7. Flexibility of Rules

As long as the concept and fundamentals of the rules are observed, these rules shall be flexible enough to encompass the changes in the number of players and of the contents of matches. Modifications or abolition of the rules can be made by the local event organizers as long as they are published prior to the event, and are consistently maintained throughout the event.

8. Liability

- A. Participating teams are always responsible for the safety of their robots and are liable for any accidents caused by their team members or their robots.
- B. The RobotChallenge organization and the organizing team members will never be held responsible nor liable for any incidents and / or accidents caused by participating teams or their equipment.