

RobotChallenge 2012 - Air Race Rules

Note: All rules are subject to change without notice.

Name of Event: Air Race

Number of Robots per Event: One

Length of Event: 15 minutes

Short Description: Flying robots have to complete figure 8's around two poles that are several meters apart. The robots have to demonstrate their ability to maneuver quickly and accurately in three dimensions.

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- Maximum dimensions of airship designs (2.1)
- Restrictions for bouyancy gases (2.3)

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. As a navigational aid there is a black dashed line on a bright background on the floor. The line has a width of 5 cm. Each dash is 30 cm long and the gap between two dashes is 10 cm. The line is indicating the figure-8 around the poles.

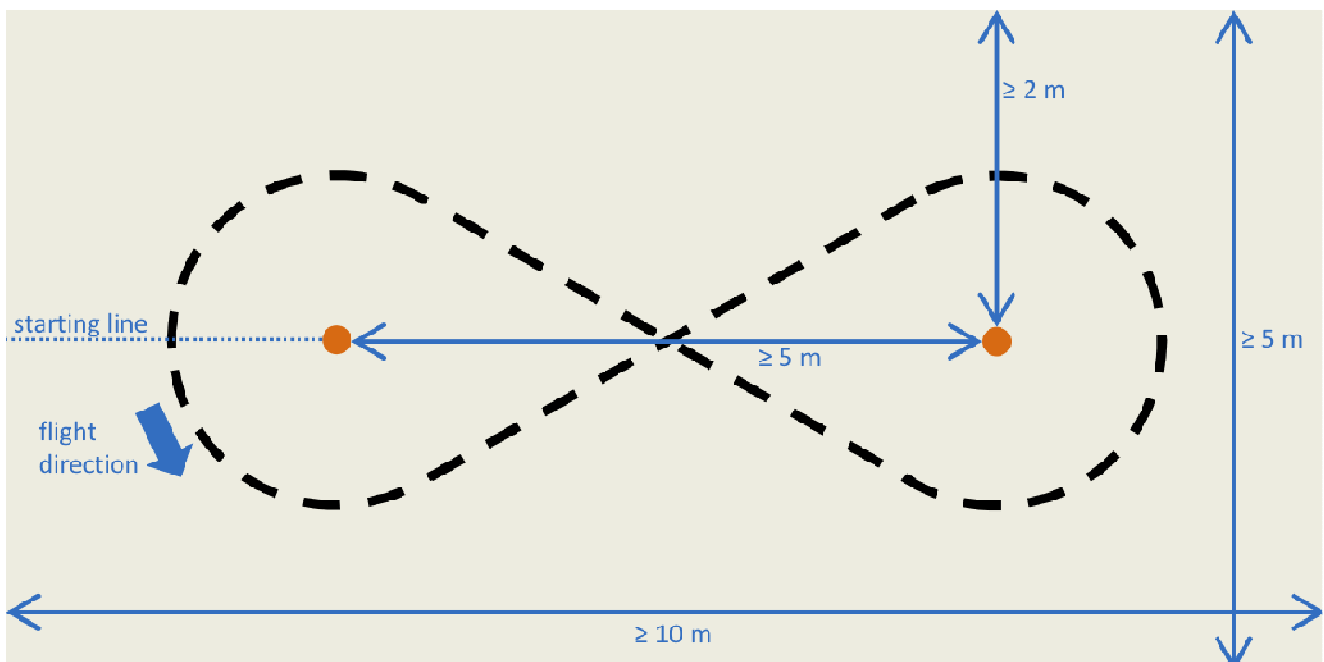


Fig. 1: Top view of the race area

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. Fixed-wing aircrafts in level flight shall not exceed a total weight of 500 g; helicopters shall not exceed a total weight of 1 kg; all other designs shall not exceed a total weight of 2 kg.
- D. A maximum speed of 10 m/s must not be exceeded.
- E. Airship designs must fit within a cuboid of 1 m x 1 m x 2 m. All other robot designs must fit within a cube of 1 m side length.

2.2. Class Specifications

- A. Each robot competes in one of the following classes, according to its level of autonomy. Different requirements apply for the particular classes.
- B. Semi-autonomous
 - a. Flying height of the robot has to be controlled automatically, without human intervention.
 - b. Computational power can be either on board or on an external computer, which communicates wirelessly with the robot.
 - c. Course control and start of the robot may be manually controlled.
- C. Autonomous
 - a. The robot must be autonomous. Any control mechanisms can be employed, as long as the mechanism does not interact with a human.
 - b. Computational power can be either on board or on an external computer, which communicates wirelessly with the robot.
 - c. Additional navigational aids can be used. These can include the dashed-line on the floor, active or passive navigational aids inside the race area, or additional guides on the floor.
 - d. Active navigational aids (e.g. infrared beacons) must run on battery; there are no power outlets available.
 - e. Setup of navigational aids must take place within the preparation time slot.
 - f. 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. A robot has to complete as many figure 8's as possible around two poles within a specified flight time of 10 minutes.
- 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. The race finishes when the flying time slot ends or when the judge aborts it.

4. Scoring

- A. The robot has to fly figure 8's around the two poles in the correct way as shown in Fig. 1.
- B. The robot scores one point for each correctly completed figure 8.
- C. The sum of all points obtained during one continuous flight counts.
- D. If there are multiple flights during the flight time slot, points for each continuous flight are counted separately. The flight with the most points counts.

5. Declaring Objections

5.1. Declaring Objections

- A. No objections shall be declared against the judges' decisions.

- 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.

6. 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.

7. 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.