

robo4you

# AERIAL JUNIOR CHALLENGE 2026

## Game Document

updated 2026-01-15



 Bundesministerium  
Bildung, Wissenschaft  
und Forschung

# Contents

1. Preface .....	3
2. Introduction .....	4
3. Participation .....	5
3.1. Timeline .....	5
3.2. Team Constellation .....	5
3.3. Drone Hardware .....	6
3.4. Drone Hardware Suggestion .....	6
4. Game Rules .....	7
4.1. Game Area .....	7
4.2. Judging .....	8
4.3. Run Procedure .....	8
4.4. Competition Format .....	9
5. Challenges .....	10
A. Visual Markers .....	12
B. Game Area Dimensions .....	13
C. Scoring Sheet .....	14

## **1. Preface**

An injured hiker is in need of help high up in the mountains. The only way to reach the patient is by air, so in this modern era, the medical team is transported using an autonomous drone.

In this competition, teams of young roboticists dive into the basics of programming robots in a three-dimensional environment. Are you ready to prove your skills by developing this prototype?

## 2. Introduction

This document describes the rules for the robo4you Aerial Junior Challenge 2026, an obstacle course challenge for small drones. Student teams program their drones to autonomously complete various tasks within the game area.

It is recommended that all participants familiarise themselves with this document. Additional information about the competition can be found on the official **website**, <https://aerial-challenge.org>. Questions about this document will be answered on the official **Discord** server, linked on the website.

Translated versions of this document are made available to prevent language barriers. For scoring and judging purposes during the competition, the **latest English version** will be used.

### 3. Participation

#### 3.1. Timeline

##### 1. Season start

The season starts with the release of this document and its associated resources. **Registration** for competition events is now open on the official website, <https://aerial-challenge.org>.

##### 2. Preparation phase

In the time leading up to the competition event, teams **develop and test** programs on their own, aided by their teachers, parents or other mentors.

Teams are advised to join the official **Discord** server for further questions, support and exchange. You can find the Discord server linked on the website.

##### 3. Competition event

Here, teams gather to showcase and compare their well-tested programs with international competitors: In **practice runs**, teams will have the chance to adapt their programs to the competition environment and make last-minute changes. In **scoring runs**, teams will get to show off their skills and score points. Also look forward to the **awards ceremony** at the end of the event!

Check the official website for details, including the **exact dates and venues** of the various competition events.

#### 3.2. Team Constellation

The competition is open to student teams of up to **four members**.

All team members must be students at or below **junior high school** level or equivalent, typically aged 10 to 15.

To keep things fair, please ensure that only official team members work on the competition code. Teachers, mentors, parents and other non-team members are **not** allowed to work on the code directly.

### 3.3. Drone Hardware

Teams must bring their **own** multicopter drone to the competition. The drone must fit inside the starting area (see Section 4.1) and weigh at most **249 grams** (EU class C0 drones).

There are **no explicit requirements** for hardware components. The drone may be equipped with any sensor systems and other hardware, provided the drone operates autonomously, without external positioning aids, and does not pose an unnecessary risk of injury or damage.

#### **Disclaimer!**

The teams are responsible for their own equipment and **any damage** caused by or done to it.

Teams may also bring up to **two** visual markers to help locate important areas when using a camera. More about markers in Appendix A.

### 3.4. Drone Hardware Suggestion

For this season's challenges, we recommend using the following sensor systems:

- An **optical flow sensor** for tracking the drone's movement and keeping it steady
- A **distance sensor** for detecting obstacles in the game area
- Alternatively, a **camera** in combination with visual markers to navigate around obstacles

#### **Suggested drone sets:**

- bitcraze: Crazyflie 2.1 + Flow deck v2 + Multi-ranger deck
- DJI: Tello EDU (comes equipped with a camera) + 2 Mission Pads

The challenges for this competition are designed and tested using the suggested bitcraze Crazyflie setup.

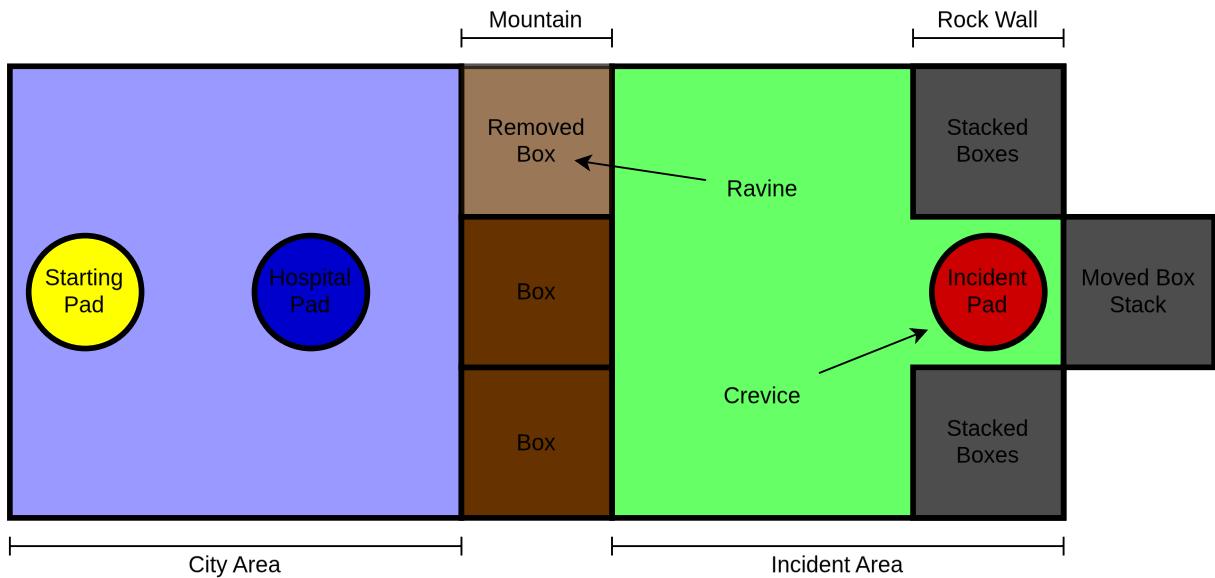


Figure 1: Illustration of the components that make up the game area.

## 4. Game Rules

### 4.1. Game Area

The game area is composed of **circular paper pads** and **cubical cardboard boxes** placed in a **3.5 meters** by **1.5 meters** area on the ground, as shown in Figure 1.

The game area is divided into the **city area** and the **incident area**. A line one cardboard box high, the **mountain**, separates these two areas. One randomly selected box is removed from the mountain to form a **ravine**. A **rock wall**, two cardboard boxes high, is placed behind the incident area. One randomly selected stack is moved backwards by one box length to form a **crevice**. The incident pad is placed inside the crevice.

The size and placement of the pads and boxes are shown in Appendix B and are subject to a **2.5% margin of error**. The design of the pads and boxes will be chosen by the organiser.

The drone is generally free to move around the game area, but it may also leave its boundaries. For safety reasons, the game area may be surrounded by a drone cage. If present, this safety net will be at least **2.5 meters** high and leave a margin of at least **0.5 meters** to each side of the game area.

## 4.2. Judging

A single judge will be defined at the beginning of a competition event. The judge will be responsible for scoring and for ensuring that the rules are followed.

The **judge's interpretation** of this document will be considered the correct interpretation for that competition event. The judge may also make **additions or exceptions** to the rules defined in this document at their discretion.

## 4.3. Run Procedure

For a competition run (practice runs as well as scoring runs), up to **two** team members enter the drone cage to prepare their run. They may only bring **one drone** and **one device** (e.g. a laptop) for starting the program.

The procedure is as follows:

### 1. Preparation

The team has **5 minutes** to start and complete their run. The team members place their drone in the **starting area** and load their program.

### 2. Randomisation

The team may now **no** longer interact with the drone other than sending a start command.

The judge selects and removes a **random** box from the mountain. The judge also selects a **random** box stack from the rock wall and moves it backwards. The team may now place their **markers** in the ravine and crevice.

### 3. Run

When everything is ready, the team sends the **start command** to their drone.

The drone may now complete **any number** of challenges in **any order**. During the run, the drone must operate **fully autonomously** and without interference, guided only by the prepared program and onboard sensors. The use of remote controls or external positioning aids is explicitly prohibited!

The run ends automatically when the **time is up**.

### 4. Scoring

The judge has observed the run and marked completed challenges on the scoring sheet. Once the **summation** of the points on the scoring sheet is complete, the team members may **check** the marked challenges and the calculation of the final score and request **corrections** if necessary. When an agreement has been reached, a **team member** and the judge both **sign** the scoring sheet, after which no more changes to the score can be made.

#### 4.4. Competition Format

During a competition event, all teams will be allocated time slots for plenty of practice runs and at least **five scoring runs**, spread over the competition days. The number of time slots allocated to each team will depend on the available time, as well as the number of teams attending the event.

At the end of the competition, teams are ranked according to the arithmetic mean of their **three highest** scores achieved in scoring runs.

## 5. Challenges

This section describes the tasks necessary to complete each challenge. Each challenge can only be completed **once per run**. The challenges are designed to be completed in order, but this is **not** mandatory. If a team finds a challenge too difficult or risky, they are free to **skip** it.

The completion of a challenge is evaluated by the judge **observing** the **intended** movement and positioning of the drone. The points awarded for each challenge are defined in the **scoring sheet** in Appendix C.

### Challenge: Mission accepted

Take off from the ground and remain in the air for at least **1 second**.

### Challenge: Pick up the doctor

Land on the hospital pad and remain landed for at least **1 second** before proceeding past the mountain.

### Challenge: Cross the mountain

Make your way past the mountain, towards the incident area.

It does not matter whether the chosen path leads above or around the mountain, or through the ravine.

**Bonus points:** Cross the mountain by flying through the randomly placed ravine.

### Challenge: Arrival at the scene

Land anywhere in the incident area and remain landed for at least **5 seconds**.

**Bonus points:** Land on the incident pad inside the crevice.

### Challenge: Back to the city

Starting from the incident area, make your way back past the mountain, towards the city area.

It does not matter whether the chosen path leads above or around the mountain, or through the ravine.

**Bonus points:** While going from the incident area back to the city area, move at a visibly slow pace and avoid sudden movements.

**Challenge: Handover at the hospital**

After returning from the incident area, land on the hospital pad and remain landed for at least **5 seconds**.

**Challenge: Back to the station**

End the run by landing on the starting pad.

## Appendix A: Visual Markers

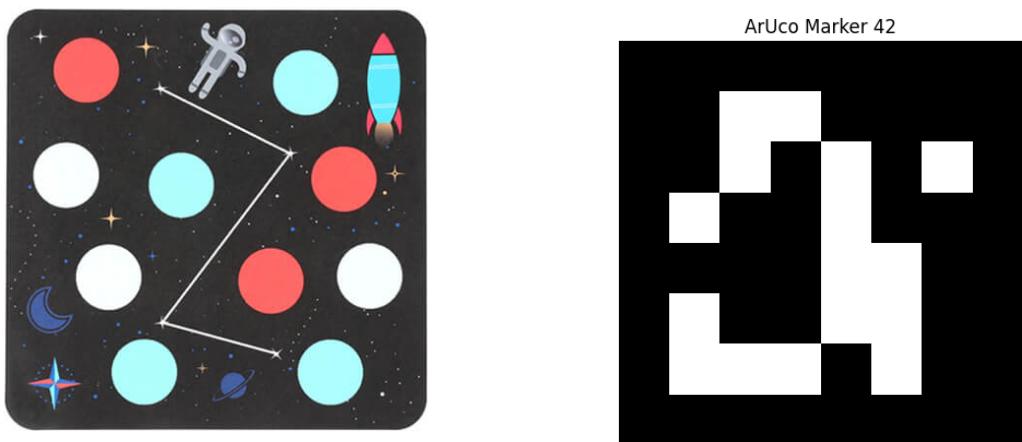


Figure 2: Example images of a DJI Tello Mission Pad (left) and an ArUco marker (right).

Visual markers are flat images that can be precisely located when in a camera's field of view, and thereby help in navigating the drone. This could for example be a **Tello Mission Pad** or an **ArUco marker**, as shown in Figure 2.

## Appendix B: Game Area Dimensions

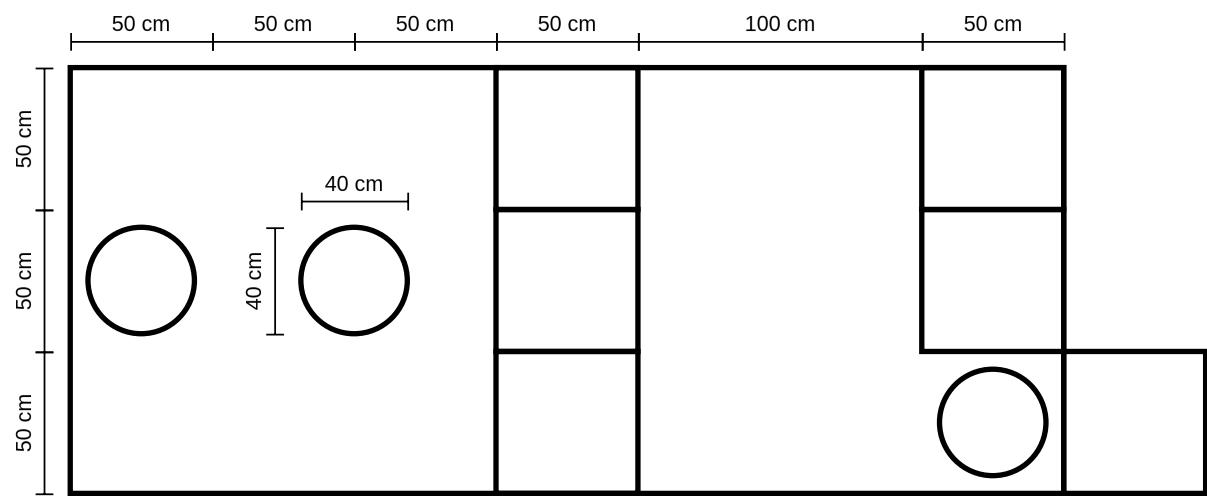


Figure 3: The exact dimensions of the game area.

## **Appendix C: Scoring Sheet**

The scoring sheet is included on the next page.

# SCORING SHEET

Team name:

Run:

Challenge Name	Points	✓
Mission accepted	10	<input type="checkbox"/>
Pick up the doctor	20	<input type="checkbox"/>
Cross the mountain	10	<input type="checkbox"/>
Cross the mountain bonus	25	<input type="checkbox"/>
Arrival at the scene	10	<input type="checkbox"/>
Arrival at the scene bonus	25	<input type="checkbox"/>
Back to the city	20	<input type="checkbox"/>
Back to the city bonus	25	<input type="checkbox"/>
Handover at the hospital	50	<input type="checkbox"/>
Back to the station	10	<input type="checkbox"/>
<b>Total</b>		

Team signature:

Judge signature: