

Cluj



**TECHNICAL
UNIVERSITY**
OF CLUJ-NAPOCA
ROMANIA

Department of Automation

Contest

20

 **accenture**

 Elektrobit

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1 Overview

The first edition of Cluj UAV 2019 is an event organized by the ROCON group from the Department of Automation, Technical University of Cluj-Napoca.

The contest will promote the engineering skills among the students in a STEM context using UAVs, the use of emerging technologies in education/research and foster the academic-industrial cooperation. The open source solutions are promoted as well as the implementation of affordable hardware platforms.

The main challenge of the contest is to navigate or track a person autonomously in a structured (urban) environment.

Each team will present the technical solution in front of a jury and will demonstrate the task for a larger audience. Both the technical solution and the demonstration will be evaluated by the jury and prizes will be awarded to the best teams.

2 Objective of the event

The main objective of the contest is to provide an opportunity for the participants to develop and demonstrate a challenging application of UAVs and also to develop team working and technical competences in an interdisciplinary field.

3 Task

The main task of the competition is to autonomously fly a drone through an unknown corridor/hallway like environment. The corridor in this edition is obstacle free, i.e. there is a clear path (where the drone can fly) in the middle of the corridor. Further details regarding the corridor are provided in the section describing the track.

4 Organization

4.1 Date and location

ClujUAV will be take place on 19th of October 2019, at the Technical University of Cluj-Napoca, Baritiu Str. 26-28.

More information is available on the website of the contest (<http://rocon.utcluj.ro/clujuav>). Here you can find more information about the jury, teams, etc., Cluj-Napoca.

4.2 Language

The official languages of the contest are English and Romanian. Communication between the teams, organizers and sponsors, as well as presentations, can be conducted in both English and Romanian languages.

4.3 Who can attend

A team will be composed of up to 6 members. Every team member must be enrolled in a Bachelor, Master or PhD program, or has obtained a BSc, MSc or PhD degree not more than 5 years before the contest date. There are no constraints regarding the programme of study or the age of the participants.

Companies can participate with their own teams or they can sponsor the event. Universities can participate with their teams.

A team can be composed of both students and graduates working in companies.

Each team should choose a consultant or a mentor from the jury mentioned on the contest website (<http://rocon.utcluj.ro/clujuav>).

Each team should nominate a speaker / leader. The leader gives a short presentation about the team and the solution adopted by the team.

4.4 Registration

To register follow the link:

<http://rocon.utcluj.ro/clujuav/index.html#registration>

The deadline for registration is 1st of September 2019.

4.5 Fees and equipment costs

There are no registration fees for the participants. The equipment used for demonstration by each team (drone, computer, software) will be provided by the participants. Teams can use only ArDrone2. In case of technical difficulties, two ArDrone2 can be provided by the organizers.

4.6 Jury

The jury members are university professors or experienced engineers or researchers working in industry. The updated list of the jury will be posted on the contest website (<http://rocon.utcluj.ro/clujuav>).

4.7 Deliverables

Each team will prepare a short presentation (in PowerPoint or pdf format) of maximum 5 slides describing the technical solution implemented. The team leader will present and defend the solution in a five minutes presentation in front of the jury. The solution will be evaluated according to the criteria presented in section 7.

The participant teams can submit a short description of the technical solution also as a maximum one page paper. These solutions will be included in a common paper and submitted for a conference publication. All short descriptions are optional, but strongly encouraged with the aim of increasing the visibility of the results to a larger audience. The papers will be sent by email to Levente.Tamas@aut.utcluj.ro at least one day before the competition (October 18, 2019).

4.8 Prizes

The prizes are offered by the two main sponsors of the event: *Accenture, Romania* and *Elektrobit Automotive România*.

Teams that entered the first three places according to the scores described in section 7 will be awarded the prizes listed in the table below. A honorable mention may be awarded to a team that did not qualify for the first three places, but presented an original smart solution.

Prize	Amount
1st prize offered by Accenture	600\$
2nd prize offered by Accenture	400\$
3rd prize offered by Accenture	300\$
Honorable mention offered by Accenture	200\$

5 Technical requirements

5.1 UAV requirements

The UAVs used in the challenge are only ArDrone2. In case the participant teams cannot provide this type of drone, or in case of technical difficulties before the beginning of the contest, the organizers will provide the ArDrone2 for the competition.

A safety flight termination button that can be activated manually must be implemented in software (i.e. the drone has to land safely anytime).

5.2 The track

The drone must fly autonomously through a typical indoor corridor with approximately 2.5-4 meters wide and 25-50m long with both artificial and natural light.

A typical setup/experiment can be seen in [this video](#).

5.3 Software

The teams must participate with their own computers and software, both suitable to connect to a generic ArDrone2, without any firmware alterations.

5.4 Communication

The communication with the drone (WiFi repeater) is ensured on a distance of up to 50 meters. Other special requirements with respect to communication must be taken care of by the participating teams.

6 Competition timeline

6.1 Rules before and during the flight

- All teams will be present at the contest location at least 15 minutes before the beginning of the event.
- Each team will have a 10 minutes time slot for flight preparation and local testing before the actual competition.
- During the competition each team is allowed two flight attempts.
- The drone must reach the end of the hallway; if this will not be the case, points will be lost as presented in section 7.
- The drone can hit a wall but points will be lost (see section 7).

- The time of the flight will be measured and considered for scoring.
- The team members are only allowed to stay at the launch point
- No attending person is allowed on the flight hallway. The attendees may follow the competition on a live broadcast or at the end of the hallway.

6.2 Competition schedule

10:00 - 10:10	Opening and rule presentation
10:10 - 11:00	Local testing: 10 minutes / team
11:00 - 12:00	Presentations of the technical approach: 5 minutes presentation and up to 5 minutes for questions
12:00 - 13:00	Competition: 10 minutes / team; two flight attempts through the corridor / team
13:15 - 13:30	Award ceremony
13:30	Lunch offered by <i>Elektrobit Automotive România</i>

7 Evaluation

The teams will be evaluated according to the best scoring obtained by following the rules below:

Rule	Score
C1. Overall technical approach presented in front of the jury	30 points
C2. Track challenge	starts from 70 points
Points are added or subtracted according to the following rules:	
C2.1. Collision with an obstacle/wall:	-10 points if the drone recovers -20 points if the drone is reset
C2.2. Each manual drone reset for other reasons than collisions:	-20 points
C2.3. Successfully reaching the end of the hall	+30 points
C2.4. Time:	
20 seconds increments	-5 points
If end of hallway is not reached	-30 points