



1st SARC-BARINET

AEROSPACE COMPETITION

COLLABORATIVE UNMANNED
AERIAL VEHICLES

Bulletin 1

Revised 22/02 2021

Introduction

Systems of systems is an important field in modern aviation and a good example in this field is unmanned aerial vehicles used in collaboration to solve a specific task. With this competition the multi-disciplinary approach needed to develop technologies for such vehicles and their applications is encouraged and fostered. Awards for the best projects in this field will be granted with backing from industries in Sweden and Brazil.

The competition is about presenting the best solution to a selected problem involving multiple unmanned aircraft. This could be a few aircraft flying in formation or a swarm of smaller aircraft.

The competition encourages collaboration between academic disciplines as well as between academy and industry and is meant as an accelerator in the field of systems of systems research and, specifically, collaborative UAVs. It aims to motivate teamwork, facilitate innovation, expand international collaboration, foster entrepreneurship, and channel research into practical use. It is open to actors from Sweden and Brazil, but not necessarily only from organizations under the SARC-BARINet umbrella.

The competition is run for the first time in 2021, with limited scope to prove the grounds, but the long-term ambition is to become a yearly event. An open class is launched in February, open to teams comprised of doctoral students, researchers, and startup companies. A student class is expected to be launched in August 2021 with teams composed of undergraduate and master level students. Entering the competition requires only a digital submission and no on-site competition event, thus removing any uncertainties with travels and the pandemic status.

Organizers

SARC is the Swedish Aerospace Research Center and is an organization with the aim of coordinating and aligning Swedish academic aerospace research. BARINet is the Brazilian Aerospace Research and Innovation Network. Jointly, SARC and BARINet work for international collaboration in the aerospace research areas. The competition is organized cooperatively between the two organizations and is additionally supported by an advisory board from the industry.

Rules

Competition entry

Entering the competition involves submitting:

- White paper describing the system/solution (accessible by all participants). Maximum 5 pages.
- Video displaying a practical demonstration of the mission and a short pitch of the idea (accessible by all participants)

The competition is comprised of two parts. A written report (white paper) describing the problem (mission) and how the problem is solved/optimized, using collaborative UAVs. The report should respond to the judging criteria and follow typical standards in writing technical/scientific reports. The second part is a video with a practical demonstration of the mission, or parts of the mission. The practical part is essential to couple theory with practice. However, to facilitate participation also on a low budget the practical part of the mission may be simplified. The physical demonstration could be using a single vehicle and the handling of several collaborative vehicles could be demonstrated

virtually. The video should include a pitch of the idea/mission limited to 5 minutes. The part of the video containing the practical demonstration has no length restriction. Both the video and white paper will be made available to all participants, for a fair evaluation, but not to the open public.

Additionally, each team is to hold a presentation at the awards workshop (not used for scoring).

The outcome of the competition is determined by a jury, assigned by the competitions advisory board, and include members from academia, industry, and other actors in aviation from both Sweden and Brazil.

Judging criteria

The Jury will judge the entry from the following criteria:

- Level of innovation – Both of the proposed solution as well as technical innovation within the solution.
- Business case – The strength of the business case of the pitched mission/solution
- Engineering achievement and demonstration
- Scientific contribution/achievement

Classes

Open class (runs in 2021):

The open class is aimed at teams assembled by PhD students, researchers and startup companies. Undergraduate students may participate as well. The team is to pitch a scenario for which multiple UAVs are used in collaboration to solve a specific problem. Examples of a typical scenario may be search and rescue, emergency response, logistics etc, but could just as well be something never before thought of. The number of UAVs used in the collaborative mission may be anything from a smaller group to a large swarm (minimum 3). The UAVs may be of fixed or rotary wing type. They may consist of identical platforms or varying sizes and configurations. The competition is about specifying the scenario and to develop the capability to solve that scenario as efficiently as possible. The capability may be demonstrated with a simulation or mission optimization, but it must also be demonstrated partly using real physical UAVs (one or more). Of the UAVs used in the physical demonstration at least one of the platform types must be designed and made by the group. This means that the mission may not be completed using only commercial drones, thus motivating traditional aeronautical engineering to also be included in the final submission. All drones used in the physical demonstration should be below 25kg MTOW and with maximum dimensions of no more than 3m (Up to EU C3 classification). There are no budget restrictions on the equipment used. Civilian missions are encouraged, but military scenarios can be accepted as long as they are non-weaponized and may serve dual use in civilian applications.

Student class (aims to launch in august 2021 and run until June 2022):

Draft rules for the student class are included for information purpose only: The student class accepts teams with students up to master's level. Similar to the open class, the team is to present a scenario for how to use multiple drones in collaboration. The difference for the student class is that there is less focus on the collaborative part and more on the platform design. In the student class the vehicles need to be designed and built by the students themselves. The UAVs should be specifically designed and optimized for the mission. The UAV weight is restricted to 4kg and should comply to EU C2 classification, and the overall project budget, in terms of material and equipment used must be kept below €3000. The submission is the same as in the open class. Both a report as well as a video of a simplified mission should be included. Teams are encouraged to work across programs and disciplines

to achieve the most out of their project. However, team members should primarily be from the same university.

Awards

- The winning team will receive a prize of 6,000 euros to defray travel expenses for team members, who will be invited to travel to Brazil (if they are Swedish) or Sweden (if Brazilian), and will meet with representatives of the country's aerospace industry.

Additionally, there will be special awards highlighting noteworthy achievements among the teams.

The winning team will be announced in September and officially rewarded at a workshop in October. This will be an online workshop where each team will hold a short presentation of their contribution.

Dates and Deadlines

- February 01 - Competition launch.
- March 12 - Statement of interest. Follow the link at the end of the document for an online register form.
- April 09 - Teams registration. Necessary for participation. Includes a short description of the problem/mission and what the teams aim to accomplish. Team members and participating companies need to be registered.
- September 15 - Submission date.
- September 30 - Winner announcement.
- October TBD - Team presentations and awards.

Bulletins

Bulletin 2 will be released in the end of March and will include additional information regarding the submission and evaluation.

Supporters



SAAB



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Competition contact:

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Please do not hesitate to contact us. Any queries regarding delimitations in the rules and team composition will be handled by the competition board.