

# STEAM DRONE PRECISION FLIGHT CHALLENGE

## RULES & GUIDELINES

*will likely vary somewhat as per local host*

The **Drone STEAM Challenge Series** announces its call for entries for the *Drone Precision Flight Challenge*.

- 1: Eligibility: The competition is open to individuals or groups of professionals, amateurs, residents, students, and visitors, as per specific guidelines and constraints of contest host (*e.g., students only*)
- 2: Fees: See the submission guidelines provided for each individual contest.
- 3: Purpose: To evaluate flight team members' skills and preparation for employment in multiple career fields related to the safe and efficient use of drone technology in the National Airspace System and to recognize outstanding performance by participants in real-world, scenario-based situations.
- 4: Competency Being Tested: Students can safely plan and manually fly a small Unmanned Aircraft System (sUAS – drone) and collect usable data as required. *Students will often be navigating a series of obstacles and landing on sites that are obscured from the pilot.*
- 5: Specifications: Specific to the hosting institution, but generally adhere to the following.
- 6: Eligibility (team of 2)
- 7: Equipment and Materials
  - ☞ *Flight teams are strongly encouraged to bring their own fully charged drones that (i) weigh less than 250 grams, (ii) have propeller guards, and (iii) have forward facing cameras. FPV goggles are allowed.*
  - ☞ *A Tello drone is the most commonly used drone for this competition, and its flight precision can sometimes be increased by using a video game controller instead of a cell phone.*  
<https://amzn.to/3gdhJID>
- 8: Contest Guidelines
  - ☞ Teams should never power on their drones until specifically instructed to do so in order to avoid conflicting controller and drone binding with other team's drones. Drones should be powered down immediately upon completion.

- ☞ No flying is allowed anywhere on the premises except in the identified competition area. Flying anywhere outside the “flight zone” will result in immediate penalty and disqualification from the event.
- ☞ Other than the team’s personal drone, supporting equipment, writing utensils, and scratch paper, no outside materials will be allowed on-site.
- ☞ After the mission is communicated via the orientation briefing, team members will have a set appointment time to complete multiple tasks and missions.
- ☞ Hot zones are identified areas the teams are not allowed to fly in. Touching these areas will result in a penalty.
- ☞ Team members will always be required to follow proper safety procedures and use eye protection in the contest area.
- ☞ During the active flight mission, the pilot must stay within the designated command area while the spotter can move freely in designated areas around the perimeter of the arena.
- ☞ All teams will be expected to adhere to the official rules for the drone competition.

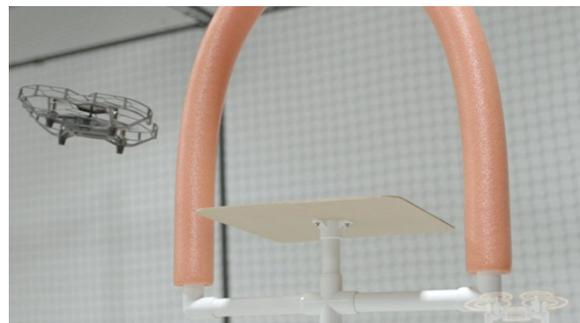
## 9: Contest Components

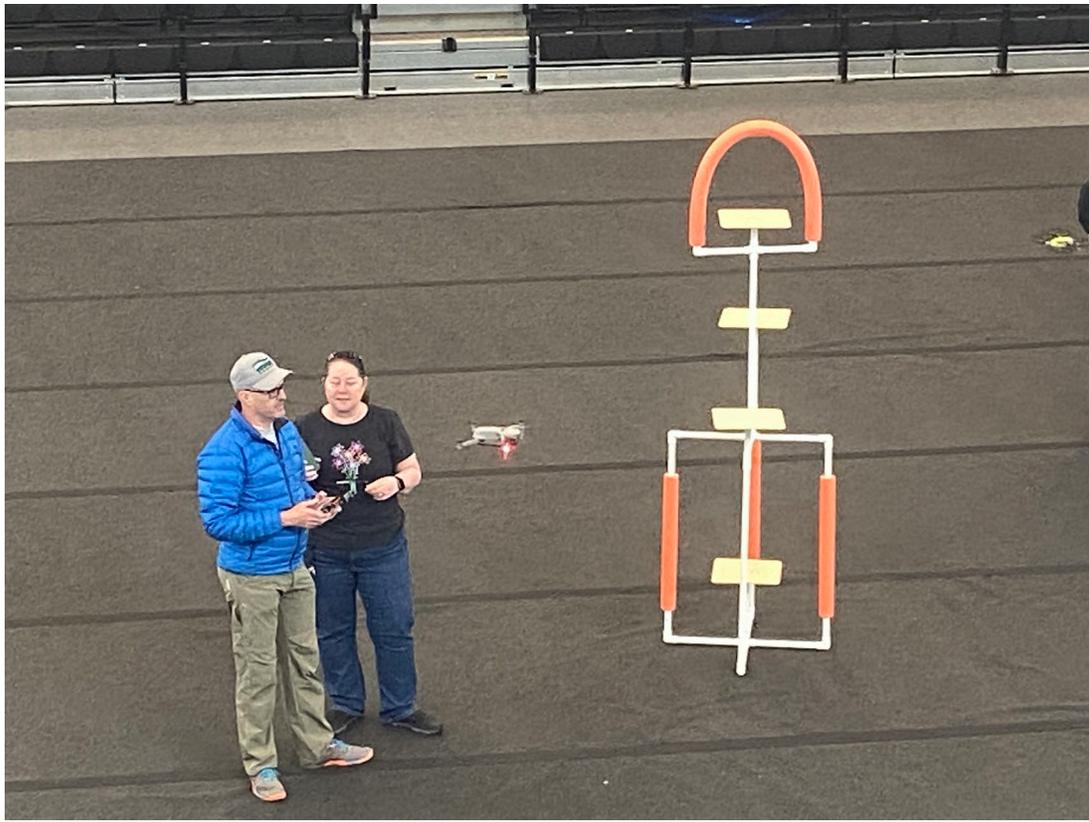
Flight Contest (15-minutes, by appointment). Teams composed of a piloting PIC and safety VO will be judged on their ability complete a series of progressively more difficult precision flight tasks within 8-minutes (such as passing through circular obstacles, landing on an unseen, obscured target with verbal guidance given by the VO and visually inspecting a searched for object using the camera). *No special attachments are required.*

See examples at: <https://shar.es/aoldjd>

Verbal Guidance: It is expected that VO’s will guide pilots when flying in unseen areas using appropriate aviation communication: roll, throttle, pitch, yaw and teams scores will be downgraded for not using these terms appropriately.

*\*If a tie-break is needed, special questions will be used as well as how close to the center of a target landing pad a drone is landed.*





# Example Score Sheet

## Task: Flight Skills

**Flight Scenario 1:** The objective of this flight scenario is to find hidden objects. Team communication is necessary for successful completion of this scenario. These objects can be under, between, or on top of some structure or object. The object has an indicator, such as number or colored sticker, that the drone has to be able to photograph and relay to the drone operator. This indicator corresponds to a landing pad that the operator must then navigate the drone to and land on.

**Flight Scenario 2:** The objective of this flight scenario is to find an object mixed in with similar objects (for example, a red dowel in a pile of tan dowels, when there are multiple piles of dowels). The drone will need to inspect and locate the object and knock it over.

**Flight Scenario 3:** The objective of this flight scenario is to fly to an object that is at least six feet tall. The course includes multiple landing pads (at least three). Each of these landing pads has a different difficulty level. Each landing pad has a small target with at least three concentric circles. Flight skills are proven based on the pilot's ability to land the drone on less accessible landing pads, on smaller landing pads, and centered on the landing pads.

**Flight Scenario 4:** The objective of this flight scenario is to navigate an obstacle course in the smallest amount of time possible.

Task: Flight Skills				<i>circle one</i>		Points
<b>Standard:</b> Pilots can safely plan and <del>both manually and autonomously</del> fly SUAS (drone) equipment and collect usable data as required.	200 pts possible	<b>Scenario 1 – Flying Blind</b>	0 20 60 80 100	0-Non Compete 20-No/Low Skill 40-Emerging 80-Proficient 100-Expert		
		<b>Scenario 3 – Precision Landings</b>	0 20 60 80 100			
<b>Standard:</b> Pilots can store, organize, and deliver/communicate data in an acceptable manner based on industry standards.	20 pts possible	<b>Scenario 2 – Use video to complete a task</b>	0 10 15 20	0-Non Compete 0-No/Low Skill 10-Emerging 15-Proficient 20-Expert		
<b>Standard:</b> Pilots can demonstrate and document a valid sUAS operational cycle.	30 pts possible	<b>Scenario 4 – Timed Obstacle course</b>	0 pts = didn't complete 7 pts > 4 min 18 pts between 1 & 4 min 30 pts < 1-min	0-Non Compete 0-No/Low Skill 7-Emerging 18-Proficient 30-Expert		
<b>No/Low Recognizable Skill</b>	<b>Emerging</b>	<b>Proficient</b>	<b>Expert</b>	<b>Total Points</b>		
0-49 pts	50-124 pts	125-199 pts	200-250 pts			

**Pilot in Command #1:**  
please print neatly

**Visual Observer #2:**  
please print neatly

**Team/Institution Name:**  
please print neatly

Official Use:

# Example Score Sheet

## PRECISION FLIGHT TASKS

*IMPORTANT NOTE: When the drone “battery fails,” the competition is “over” or 15-minutes total has elapsed, whichever comes first. Kindly note that some teams will NOT make it to the final scenario obstacle course, as part of this judged competition*

Flight Scenario	Task Description	No Recognizable Skill
		Emerging
		Proficient
		Expert
Scenario 1 – <i>Flying Blind</i>	Unable to see the “obstacles or landing platforms”, VO directs pilot to “look inside” with video camera and determine which “color” landing pad is assigned, and communication is done using appropriate (yaw, roll, throttle) and airfield operations commands [100 pts]	0-Non Compete 20-No/Low Skill 40-Emerging 80-Proficient 100-Expert  Only a perfectly executed run achieves top “expert” score
Scenario 3 – <i>Precision Landings</i>	In full view of the course, and with support from VO, land sequentially on landing pads <i>(judge calls when to move to next pad)</i> [100 pts]	0-Non Compete 20-No/Low Skill 40-Emerging 80-Proficient 100-Expert
Scenario 2 – <i>Use video data to complete a task</i>	In full view of the course, and with support from VO, the PIC completes a task knocking down an object of a specific description <i>(given by the judge)</i> [20 pts]	0-Non Compete 0-No/Low Skill 10-Emerging 15-Proficient 20-Expert
Scenario 4 – <i>Timed Obstacle Course</i>	Upon the announced starting of a “timer” from an event judge, and in full view of the course and with support from VO, the PIC passes the drone through a series of gates in the prescribed sequence. A missed gate requires the team to go back to that gate and try again until they complete each gate passage in sequence. [30 pts]	0 pts = didn’t complete 7 pts > 4 min 18 pts 1 < time < 4-min 30 pts < 1-min