



DRONE ODYSSEY CHALLENGE 2020

ONLINE CHALLENGE MANUAL

Main Organiser:



Introduction

Drone Odyssey Challenge 2020 (DOC2020) is an exciting game-based competition that promises plenty of fun while inculcating technical skillsets, creativity and an appreciation of technologies relevant to the modern world. Open to students from the Primary and Secondary levels, this competition will see participants code their programmable drones to perform tasks under given scenarios. Drone Odyssey Challenge is organized by Science Centre Singapore with support from the Ministry of Education (MOE) and various partners.

DOC2020 will be held **Online** and will consist of the following three Challenges:

1. Obstacle Challenge (Individual)
2. Coding Challenge (Individual)
3. Drone Performance Challenge (Team of 1 - 3)

The Online Challenges are open to students from the Primary and Secondary levels (suitable for ages 10 – 16).

Challenge registrations will be open from **3 July to 10 August 2020**.

For international participants (not from Singapore), please contact Daniel Seck at daniel_seck@science.edu.sg for registration and more information.

Categories

Challenges	Awards	Prizes
Obstacle Challenge	Best Drone Flying Award for Primary Category (up to 10 awards)	E-cert of Distinction
	Best Drone Flying Award for Secondary Category (up to 10 awards)	E-cert of Distinction
Coding Challenge	All Distinction Awardees *with distinction score ($\geq 80\%$)	E-Certificate of Distinction
Drone Performance Challenge	First Place	E-cert 1 st place
	Second Place	E-cert 2 nd place
	Third Place	E-cert 3 rd place
	Consolation Prize (up to 2 awards)	E-cert Consolation

Note:

- All Participants will receive E-certificate(s) of Participation upon submission of the challenge(s) if they are not recipients of the above awards
- The Final number of awards given will be up to the discretion of the organizer.
- All dates and times mentioned in this booklet refers to Singapore timing (GMT +8).

Flying Safety and Flying Safely

All participating teams should adhere to the following during the flying of the challenges.

- **Flying Regulations (International participant is to follow the flying regulations in their respective country)**

All flying must be conducted

- i. In accordance to Civil Aviation Authority of Singapore's (CAAS) UA Safety Guidance (<https://www.caas.gov.sg/public-passengers/unmanned-aircraft/ua-safety-guidelines>). Participants who do not meet safety & regulatory requirements would be immediately disqualified from the competition.
 - ii. Only in permitted flying areas as advised in CAAS's site on "permitted fly and no-fly zones". (<https://www.caas.gov.sg/public-passengers/unmanned-aircraft/permitted-flying-areas-and-no-fly-zones>).
 - iii. Social distancing and relevant Safe Management Measures policies should also be followed during team events.
- **Guardian as Safety Supervisor**
 - i. Every individual/team should have a guardian during his/her attempt at flying. Guardian should be age 21 or above. Safety supervisor's duty is to ensure that Flying is conducted in a controlled environment and proper safety measures are in place to minimize injury or damage to property; and verify the participants' attempts to make sure flying regulations are comply with.
 - **Checklist for Safety Supervisor**
 - i. Pre-Flight Preparation of Space

Participants selected and prepared flying area, such that it complies with CAAS flying regulations and fly zones. (Refer to websites listed above) (Examples would be closing windows in an enclosed room, restricting entry during flight.)
 - ii. Pre-Flight Planning & Communication

Participant do preflight planning and explain to the Safety Supervisor of their

 1. Flight Plan
 2. Contingency Plans. (e.g. Fly away Drones, or crash)
 3. Procedure to Turn off drone, in event of emergency landing.
 - iii. In-Flight Safety
 1. Safety Officer & Participants to ensure no one is within 1m of the drone prior drone take off.
 2. Participants announce "arming drone" to indicate flight test to surrounding.
 3. Participants made appropriate measures to restrict entry into the flight zone during flight.
 4. Participants should be ready to conduct drone emergency landing at all times.
 - iv. Post-Flight Safety

Participants announce "disarming drone" to indicate end of flight and take actions to turn off drone.

Obstacle Challenge

The Obstacle Challenge will enable participants to learn about the basics of Drone Flying and the different flight configurations they can explore with drones. This challenge is split into 4 subcategories for the tutorial and tasks:

1. Primary – DJI Tello
2. Primary – Parrot Mambo
3. Secondary – DJI Tello
4. Secondary – Parrot Mambo

Challenge Participation Process:



1. Participants are to register for the Drone Performance Challenge.
 - 1.1. Registration Period: 3 July – 10 August 2020.
 - 1.2. Please note that this is an individual challenge.
2. Participants will receive the links to the tutorial videos, along with the tasks to complete, **by 11th August 2020** through their emails.
 - 2.1. These tutorial videos can be viewed at your own timing.
 - 2.2. These tutorial videos will also contain the tasks that you should attempt.
 - 2.3. The tasks that are also included in the video are shown in the table below.
 - 2.3.1. For the Primary Category, participants need to perform **at least 4 out of the 5 basic tasks**. Advanced tasks may be substituted for basic task.
 - 2.3.2. For the Secondary Category, participants need to perform **at least 3 out of the 5 basic tasks, and at least 2 out of the 5 advanced tasks**.

Basic Tasks (B)	Advanced Tasks (A)
B1. Flip TWO (2) times.	A1. Fly through THREE (3) loops
B2. Take off from one location, land in another location, and take off again.	A2. Flying in a square flight path, with the drone facing away from you at all times.
B3. Land on a box of any size.	A3. Flying in a square flight path, with the drone facing in the direction of the flight path at all times.
B4. Perform a "Z" path.	A4. Drone takes measurement of the height of the box below it.
B5. Fly through a circular hoop.	A5. Drone take a picture of the box below it.

3. Participants may prepare and film their attempt once they have planned out their tasks.
 - 3.1. Please adhere to the following rules for your video:
 - 3.1.1. The attempt should not exceed FIVE (5) minutes.
 - 3.1.2. Tasks completed should be clearly seen in the video for it to be considered.
 - 3.1.3. The drones are to be pre-programmed and NOT be controlled manually.

- 3.1.4. Participants are to introduce themselves with their safety supervisor, indicate the flight path and tasks that they are attempting before their attempt.
 - 3.1.5. It is not necessary to show the process of coding and building the course.
4. Submit your performance (video weblink and code file) by **7th September 2020, 1700 hours**, in accordance to the following guidelines:
 - 4.1. Upload your **video file on YouTube** (can be an unlisted video).
 - 4.1.1. Video duration must not exceed FIVE (5) minutes.
 - 4.1.2. Video resolution must be at least 720p.
 - 4.1.3. Video layout must be in landscape.
 - 4.1.4. Only royalty-free music is allowed in the video (strictly no usage of copyright music/footages from artists, records companies or movies)
 - 4.2. Prepare your program code document.
 - 4.2.1. The program code used should be screen captured and included in a Word document.
 - 4.2.2. Teams should include notes to explain what each segment of the code does.
 - 4.3. Include the YouTube weblink and document file of the program code used to the Drone Odyssey email.
 - 4.3.1. Drone Odyssey email: *drone_odyssey@science.edu.sg*
 - 4.3.2. Please include your name, School/Organization and Level (Pri/Sec) in the email with the subject 'DOC Obstacle Submission'.
 5. Judging for the Best Drone Flying Award will commence according to the rubric guide below.
 - 5.1. Video duration is not a criterion for scoring.
 - 5.2. Unique entries may stand at advantage for scoring.
 - 5.3. Tasks completed beyond the basic requirements may stand at advantage for scoring.
 - 5.4. All submissions received before the deadline will receive an e-Certificate of Participation.

Criteria	
Obstacle Course	Creative Course Design
	Unusual Resources
Drone Flying	Coding
	Creative Flying
Overall Video	Presentation

Registration Fee:

There is a registration fee of SGD30 for every overseas student participating in Obstacle Challenge. Full payment is required upon registration to confirm your participation.

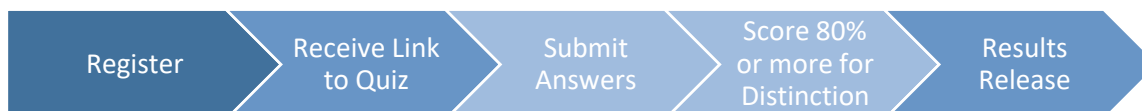
Disclaimer:

- The Organizer reserves the right to disqualify any submission if it does not comply with the submission rules.
- In the case of copyright infringement, the teams will be held solely responsible should the video be removed before judging.
- Participants should ensure that videos remain online for judging until the results are out.
- Late submissions (after 7th September 2020, 1700 hours) will be not be eligible for any prizes or awards.
- By submitting the videos, you acknowledge that Science Centre Singapore is free to use the videos in any form for any post event publicity related to DOC2020.

Coding Challenge

The Coding Challenge will test the coding skills and drone knowledge of the participants. The challenge is split into 2 sub-categories, Primary and Secondary. The quiz will be based off Block Programming and drones' knowledge and safety.

Challenge Participation Process:



1. Participants are to register for the Drone Performance Challenge.
 - 1.1. Registration Period: 3 July – 10 August 2020.
 - 1.2. Please note that this is an individual challenge.
2. Participants will receive the link to the quiz at least one (1) day before the quiz is open.
 - 2.1. Quiz will be open for submissions on **17th August 2020, 1600 hours**.
 - 2.2. Quiz will be MCQ based.
 - 2.3. Quiz will be testing on the participant's knowledge of drones and its safety, and Block Programming of Drones.
3. Scores will be given according to the number of questions answered correctly.
 - 3.1. Submissions with a score of 80% or more will be awarded with an E-Certificate of Distinction.
 - 3.2. Only the first submission of each participant will be considered for scoring.
4. The quiz link will close on 31st August 2020, 1700 hours.
 - 4.1. All submissions received before the deadline will receive an e-Certificate of Participation.
5. Final results will be released on 21st September 2020 on the Drone Odyssey Challenge event page at the Science Centre Singapore website.

Registration Fee:

There is a registration fee of SGD30 for every overseas student participating in Coding Challenge. Full payment is required upon registration to confirm your participation.

Drone Performance Challenge

The Drone Performance Challenge enables participants to showcase their creativity and choreograph a drone swarm performance. Teams of up to THREE (3) individuals, in Primary and Secondary levels, can register to compete in the challenge. The performance should not exceed SIX (6) minutes, and should consist of a minimum of TWO (2) and up to EIGHT (8) programmable drones.

Challenge Participation Process:



1. Participants are to register their team(s) for the Drone Performance Challenge.
 - 1.1. Registration Period: 3 July – 10 August 2020.
 - 1.2. Each team should have up to 3 individuals.

2. Participants may prepare and film their performance once their registration is accepted.
 - 2.1. As there are limited slots for this challenge, each School/Organization can only register TWO (2) teams. There are no limits to the number of private teams.
 - 2.2. There are no restrictions on the presentation of the performance (eg. short story, dance, etc.). However, please adhere to the following rules for your performance:
 - 2.2.1. The performance should not exceed SIX (6) minutes.
 - 2.2.2. A minimum of TWO (2) or a maximum of EIGHT (8) programmable drones are to be used.
 - 2.2.3. **The drones can be pre-programmed or controlled manually, however pre-programmed drones will have a scoring advantage than manual control under the technical merit component (refer to Annex 1);**
 - 2.2.4. Attachments/payloads/props may be added to the drones as part of the choreography.
 - 2.2.5. Any number of team members may be included as part of the choreography.
 - 2.2.6. The area for the choreography should not exceed 6m x 6m. The height of the flight should be in accordance with country drone flying regulations.
 - 2.2.7. Participants are to introduce themselves with their safety supervisor.

3. Submit your performance (video file and code file) by **28th August 2020, 1700 hours**, in accordance to the following guidelines:
 - 3.1. Upload your **video file on YouTube**.
 - 3.1.1. Video duration must not exceed SIX (6) minutes.
 - 3.1.2. Video resolution must be at least 720p.
 - 3.1.3. Video layout must be in landscape.
 - 3.1.4. Only royalty-free music is allowed in the video (strictly no usage of copyright music/footages from artists, records companies or movies)
 - 3.1.5. The video is to be taken in one continuous shot.
 - 3.1.5.1. No video editing of the performance is allowed.
 - 3.1.5.2. Editing of sound/music or volume is allowed. Subtitles may also be added.
 - 3.1.5.3. The camera can pan and change position any time during the performance if desired.



- 3.1.5.4. Teams are to include a short introduction slide indicating the team name, school/organization in the first TEN (10) seconds of the video. The slide template will be sent by the Organizer after the teams are registered.
 - 3.2. **WeTransfer** your video file to the Drone Odyssey email.
 - 3.3. Prepare your program code document.
 - 3.3.1. The program code used should be screen captured and included in a Word document.
 - 3.3.2. Teams should include notes to explain what each segment of the code does.
 - 3.3.3. Submission without the program code will be taken as manually controlled
 - 3.4. Include the YouTube weblink, WeTransfer link and Word document file of the program code used (if any) to the Drone Odyssey email.
 - 3.4.1. Drone Odyssey email: *drone_odyssey@science.edu.sg*
 - 3.4.2. Please include your team members' name, School/Organization and Level (Pri/Sec) in the email with the subject 'DOC Performance Submission'.
4. Judging will commence according to the rubric guide in Annex 1.
 - 4.1. All submissions received before the deadline will receive an e-Certificate of Participation.
 - 4.2. Top 5 entries will be shortlisted for online voting. The Top 5 teams will be notified by email.
 - 4.3. Public voting will commence from 5th to 13th September 2020. The voting link will be up on Drone Odyssey Challenge event page at the Science Centre Singapore website.

Registration Fee:

There is a registration fee of SGD30 for every overseas student participating in Drone Performance Challenge. Full payment is required upon registration to confirm your participation.

Disclaimer:

- The Organizer reserves the right to disqualify any submission if it does not comply with the submission rules.
- In the case of copyright infringement, the teams will be held solely responsible should the video be removed before judging.
- Late submissions (after 28th August 2020, 1700 hours) will be not be eligible for any prizes or awards.
- By submitting the videos, you acknowledge that Science Centre Singapore is free to use the videos in any form for any post event publicity related to DOC2020.

Annex 1 – Judging rubric guide for Drone Performance Challenge

The performance (video file and program code) will be judged based on the following criteria. This will form 70% of the final score.

<p>Technical Merits (40%)</p>	<ul style="list-style-type: none"> - Number of drones used. - Execution: How well the moves are executed. - Difficulty: How challenging are the moves attempted. - Coding: How concise is the code, does it have a logical/sequential flow, are there modified/self-written functions.
<p>Artistic Impressions (30%)</p>	<ul style="list-style-type: none"> - Choreography: How varied, smooth and creative a routine is, covering the whole staging area. - Music interpretation: How the mood and dynamics of the music complement the performance. - Composition: The combination of different elements in the drone performance (music, payloads, props, cultural components, etc) and how well they blend together to complement the theme.

The Top 5* from this judging will be shortlisted for public voting. Public votes for the Top 5 will be collated and ranked. The percentage allocated to each of the Top 5 will be as follows:

- 1st rank (most votes): 30%
- 2nd rank: 25%
- 3rd rank: 20%
- 4th rank: 15%
- 5th rank (least votes): 10%

The combination of the 2 scores will form the final score for the team.

*Disclaimer: The number of final shortlisted teams is up to the discretion of the Organizer.