2017th USC Student Competition Q&A

2016-09-26

1. Do we have to design the drone from the scratch? Or we can buy a commercial drone and embed our algorithms and codes in?

Definitely, most of the team integrates product they find in the market. The more you integrate, the more time you get to prepare yourself for the competition and test your aircraft.

2. We have a company supporting our lab right now. They also show interests in this competition. What kind of help can we get from them? Is it ok to put their logo on our drone? Can they buy us the instruments we need?

They can provide you any kind of help you need (specially financial and material). Feel free to put their logo on your drone, it is a very good visibility for them.

2016-10-01

For the geese to be identified, can we have information on their approximate size and shape? We would like to produce the same targets for testing purposes, so if you could provide us with the source to buy those 'synthetic' geese that would be great.

The goose decoys are Sillosock snow and Canada geese decoys and can be purchased (or examined if you don't want to buy them) at any Cabela's Sporting good store (see the photo circulated earlier of the decoys. They are about $100 for a dozen (they come in packages of 12; full heads are more expensive but not likely needed for your purpose). Their appearance on the ground depends a bit on the wind. Some will have the full plastic heads and some will have silhouette heads that will be more difficult to see from directly above but the bodies are the same for both and are 3 dimensional. There is a possibility that some decoys will be what are called Texas Rags and can also be purchased there. They are flat pieces of plastic and are larger but two dimensional. Texas Rags may be folded to give more of a 3 intentional shape but smaller profile.

For the egg to be retrieved, the weight is given to be from 60-100g. Based on that information, can we assume that the egg that will be used in the competition is chicken eggs? what is the range of egg diameter we should expect?

The eggs will be large chicken eggs that you can buy at your local grocery store.

The CONOPS specified that statistical (Ripley's K-factor) analysis will be performed on nest distribution (hence *nesting pairs*) - does that imply that for *non-nesting pairs*, we only need to count their quantities according to their type, without having to geotag their locations?

The non-nesting birds will be in flocks, not pairs and the flock size will be variable. Teams don't have to geotag their locations.

2016-10-10

2017th USC Student Competition Q&A

1. Reference is made in Appendix C to the egg retrieval area. This used to be shown in Figure 1 which was replaced by the new flight area. Is the egg retrieval area to be treated as the entire flight area shown in Figure 1 of Rev1 of the conops or the area marked in Figure 1 of the Initial Release?

Conops to be updated with the exact egg retrieval aera.

2. This my be a typo but on page 17 at the bottom of the page, no reference is made to system capabilities or ease of use in the calculation of the score. Are these values part of the teams score?

Conops to be updated.

2016-10-14

When must we arrive in Alma, QC? Evening April 27, 2017 or morning April 28, 2017?

Teams usually arrived on Thursday's evening.This gives time to the teams to get prepared and work on their systems. Activities will start quite early on April 28th (usually around 7:30am).

Where will we be staying and how will we transport ourselves from the accommodation to the competition site?

Lodging buildings are about 7min buy car from the competition site. Team are responsible for their transport. In your case, probably a car rental at the airport could be a good idea.

How do you suggest we transport our plane from X, AB to Alma, QC?

o Our design is modular and should be able to check in as oversize luggage on our flight but how do we transport high energy density batteries?

All material could be shipped to Alma's UAS Center of excellence prior to the competition. Batteries are considered dangerous goods. They can be shipped by ground or air cargo but they must be prepared by a certified shipper. Most cities have companies that will prepare them for shipping. Contact FedEx, UPS etc. for suggestions.

Do we require insurance for our plane or is that included with SFOC?

You would require insurance to cover your local operations on your test site in order to obtain a SFOC. You would need an SFOC that will cover your test site operations and that will mentioned that you are participating to USC student competition. USC has an insurance that covers the operations during the competition.

What kind of sponsorship opportunities can Canadian Unmanned Systems provide to our team?

Unmanned System Canada can't support/offer any sponsorship opportunities to the team.

2017th USC Student Competition Q&A

What are the dimensions of egg and is it fragile (like a real egg)?

The eggs will be large chicken eggs that you can buy at your local grocery store.

Does egg retrieval need to be completely autonomous?

No

Does image processing need to be done on the aircraft, or can it be transmitted to ground station and processed there?

Your choice

What is the approximate total flight distance required?

You will have to figure this out from your analysis of the problem. We have provided the flight area and targets will be distributed through this area in the non forested areas.

Can we obtain sample geese models, nests and eggs for testing purposes

The goose decoys are Sillosock snow and Canada geese decoys and can be purchased (or examined if you don't want to buy them) at any Cabela's Sporting good store (see the photo circulated earlier of the decoys. They are about $100 for a dozen (they come in packages of 12; full heads are more expensive but not likely needed for your purpose). Their appearance on the ground depends a bit on the wind. Some will have the full plastic heads and some will have silhouette heads that will be more difficult to see from directly above but the bodies are the same for both and are 3 dimensional. There is a possibility that some decoys will be what are called Texas Rags and can also be purchased there. They are flat pieces of plastic and are larger but two dimensional. Texas Rags may be folded to give more of a 3 intentional shape but smaller profile.

What are the dimensions of the nest?

The nest will contain from 1 to about 6 eggs as they would be in nature.

Will the egg always be inside a nest?

The nest is defined by a nesting pair and the eggs will be near them.

What is the maximum wind speed at which the competition will not be canceled?

There is no wind or rain limitation.

Is there a minimum flying altitude?

No

Will the birds and eggs be all on the same terrain? (Some on snow, rock, grass shrubs)

2017th USC Student Competition Q&A

They will not be in forested areas. They may be near other obstacles. We will try to emulate real behaviour.

2016-11-04

First, for this quest, we want to use an unmanned multirotor. But, we would like to know if it is possible to land the multirotor to grab the egg, or do we need to stay in the air while grabbing the egg?

You can land your vehicle to grab the egg.

Also, the conops says that we can't use a UGV, but if we have a wheeled landing gear and we can roll on the ground with our multirotor, is it counted like a UGV?

No, you can use a wheeled landing gear to roll on the ground with your multirotor.

As well, we are wondering how the eggs will be placed on the ground, like will they be placed on a flat place on the ground, or can the eggs be place on a uneven ground?

You will have to determine this during your flight. They can be on both types of surface.

Will the eggs be near from each other?

You will have to determine this during your flight.

2016-11-03

How is the egg placed? Is it located on the ground, in a nest, or in a container of some type?
It will be located on the ground in a simulated nest. The nest material will be straw or grass, similar to actual nests.

If there is more than one egg in a 'nest', how close will the eggs be to one another? Are specific distances/areas available?
There will be 3 to 6 eggs per nest as in nature. They may be touching each other. Some nests may have fewer eggs.

What constitutes a 'nest'? Do we have to account for debris like twigs or rocks around the eggs?
A nest is defined by a nesting pair of geese less that 3 meters apart. See the CONOPS. There may be natural debris near or around the nest.

Are we picking up eggs on level ground? What can we expect for immediate surrounding terrain?
The terrain will be the grassy areas around the runway at Alma.

2017th USC Student Competition Q&A

Will a penalty be incurred if more than one egg is collected at a time?
No

Can we land to pick up an egg, or must we remain airborne during retrieval?
You can land.

Is the 'egg' in question an actual chicken egg?
Yes.

2016-11-14

What is the level of autonomy required for counting geese and calculating Ripley's K factor?

After taking images/video, can we fly the drone back to the GCS and get images off the camera directly?

Yes, all can be done manually

Do we need to transmit them back to our ground station?

If you want, but it is not mandatory

Do images need to be computer processed or can the ground station crew simply count the geese?

Either ways are good

Is the nest a physical nest or just an area of flat ground where eggs are laid?

Does it have a height?

Everything is possible, your team will have to determine that factor. We will try to make the nest resemble as close as possible as in real life.

Would it be possible to get a picture of an example nest?

No

Do we get more points for using higher levels of autonomy?

We do not evaluate your aircraft level of autonomy. In this case, autonomy would only help you in succeeding your mission.

2017th USC Student Competition Q&A

2016-11-30 (team's teleconference)

Eggs Specifically**: is there going to be any kind of obstruction to the eggs on the ground, and how are they going to be attached on the ground?**
Answer: Gravity / eggs will be place on the natural ground

Eggs: If you break one of the egg is there a penalty?
Answer: You need to deliver an unbroken egg. You don't have any penalty if you break a egg in the process.

Can we taxi back from the egg retrieval area?
Answer: No

Paul: A lot of questions about eggs/ nest location will be in the recovery zone. You could have a direct line of sight for your video transmission.

Are the birds are real birds?
Answer: No

Is there any extra points on delivering more than one egg?
Answer: No

2016-11-29

If we break an egg but successfully retrieve another, do we still get full points for this category?

YES

Can you clarify what the colours mean on the new map in the most recent CONOPS?

1. The initial release of the CONOPS showed a specific area for egg pick-up - is this no longer the case? Is the entire search area potentially containing eggs?

The egg retrieval area is shown at page 7 in the conops. Only the outside boundaries of the zone are represented in yellow on the picture. All the eggs to be retrieved will be located in this zone.

If egg pick up is limited to a particular area, is this the only area where nesting pairs are found?

Nesting pairs will be found throughout the entire area. Nesting pairs with eggs will only be found in the egg retrieval area.

Do groups of 3 or more geese within specific distance parameter count as a nesting pair?

No, nesting pairs are pairs.

2017th USC Student Competition Q&A

What are the ground conditions around the eggs? (Is it safe to land a multirotor system to pick up the egg?)

Not known, it will be the condition found in the springtime in Alma.

2017-02-15

Does a multirotor pilot need to remain on the runway and/or hands on sticks at all times? (ie. can they assist with ground control station activities while the multirotor is performing an autopilot mission?) - The multirotor can emergency land on its own without the safety pilot.

Pilot needs to remain attentive to the UAV operation at all time for safety matters. Meanwhile, he can use any type of control devices (e.g. RC, tablets or PC)

Is it required to report the number of groups of three or more geese? The CONOPS seems to be unclear about this.

- On page 11, under the Targets heading, it lists that groups of three or more geese but not necessarily nesting pairs are one of the targets;
- On page 12, under the Reporting heading, it only lists:
  - number of nesting pairs
  - geo-location of each nest
  - statistical analysis of the nest distribution

Nesting pairs are of the same species less than 3 meters apart. If there is another goose of a different species within 3 meters it is still a nesting pair. There will not be 3 geese of the same species within 3 meters of each other.

If there are three geese inside a 3m-diameter circle, and two are the same species (a nesting pair), does the other-species goose prevent there being a nest here, or is it ignored? Similar question with 4 or more geese in a circle and only 2 same-species

Still a nest.

If three or more geese of the same species are all inside a 3m circle, how many nesting pairs does this represent?

This will not happen.

If three or more same-species geese are arranged linearly with every two adjacent geese within 3m of each other but non-adjacent geese outside of 3m, how should nesting pairs be determined? Or will this not be possible during the competition? To clarify, three geese may form a straight

line with positions 0m from origin, 3m, and 6m. Geese #1 and #2 are 3m apart, geese #2 and #3 are 3m apart, but geese #1 and #3 are 6m apart. How many nesting pairs does this represent? Will a goose in the middle belong to only one nesting pair?

This will not happen.

Do we need to label the specific breed of goose (eg. snow goose) or can we label as goose type 1, 2, etc.

Yes. Specifics.

Teams Teleconference meeting March 31st

Questions:

How will the different species be differentiated?
The decoys are the natural colours of the geese.

How many species will be present?
You must determine the number.

Will eggs be different by species? If so how will they be differentiated?
No

Will eggs be placed horizontaly, supported verticaly, or a mix to emulate natural environment?
Placed as they would be in a natural nest.

Will the eggs vary in size or be one standard egg size (XL, L, S)?
The eggs will be large chicken eggs that you can buy at your local grocery store.

Will nests be physical objects/structures, or simply the point between nesting pairs?
Point between nesting pairs.

Will eggs be placed directly in grass, or on a flat surface (example: card board, paper plate etc.)?
In the grass or a simulated nest.

Can more details about terrain be given?.
No. Environment around the airport and farmers fields.

How should this be performed? Fully autonomously, or can numbers be input post flight into another program.?
Your choice.

2017th USC Student Competition Q&A

What are the exact zone delimitation coordinates?

Figure 2: Map of Competition Area (shaded area)

Table 2: Coordinates of competition perimeter

Corner Reference	Decimal Degree
SC 1	48° 30' 40.76" N 71° 39' 07.01" W
SC 2	48° 31' 08.00" N 71° 38' 58.00" W
SC 3	48° 30' 52.22" N 71° 37' 26.08" W
SC 4	48° 30' 15.24" N 71° 37' 45.32" W
SFOC 1	48° 30' 41.00" N 71° 39' 17.00" W
SFOC 2	48° 31' 16.00" N 71° 39' 05.00" W
SFOC 3	48° 30' 56.71" N 71° 37' 17.08" W
SFOC 4	48° 30' 09.91" N 71° 37' 41.52" W
UAV L&R	48° 30' 37.58" N 71° 38' 52.22" W
GCS area	48° 30' 34.09" N 71° 38' 52.93" W

What differentiates a *forested* area of a *non-forested* area?

Answer is coming soon…