

Edmonton Airports

Innovation in an Aerodrome Environment

Dean Ervin,
Director Aerodrome Operations & Compliance
dervin@flyeia.com

SWIFT 2022 – Montréal, Canada

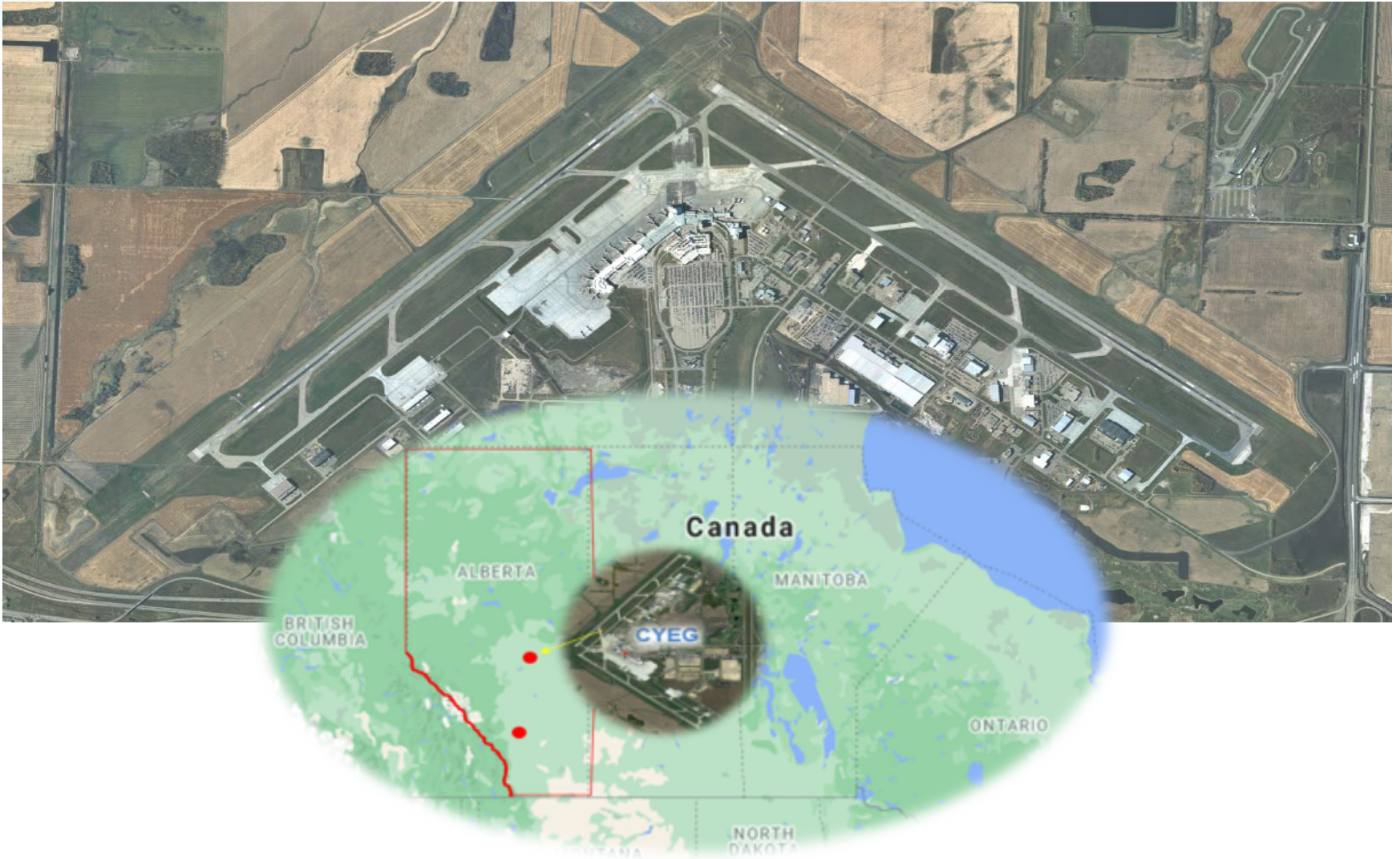


EIA EDMONTON
INTERNATIONAL
AIRPORT

Edmonton International Airport



CYEG



Overview

CYEG safe integration of RPAS usage into critical operational aspects of day to day activities both airside and groundside.

Wildlife Control RPAS Operational Utilization, Drone Delivery, Autonomous Vehicle Tech...

- ROBIRD / Wildlife Management
- Drone Delivery
- High Resolution Imagery, Survey
- Topographical Analysis
- Inspection; Substrate/Facility



ROBIRD

8th Season of Program Implimentation at CYEG

- Thousands of missions
- Excellent “tool” in our Wildlife Prevention tool box.

Based on a female peregrine falcon

TOW: 800 grams
Max flight time: 12 minutes
Propulsion Flapping wing
Max airspeed: 20 m/s; 38 kts

Completely controlled predator
➤ We are in full control





Perceived predation risk: Instinct

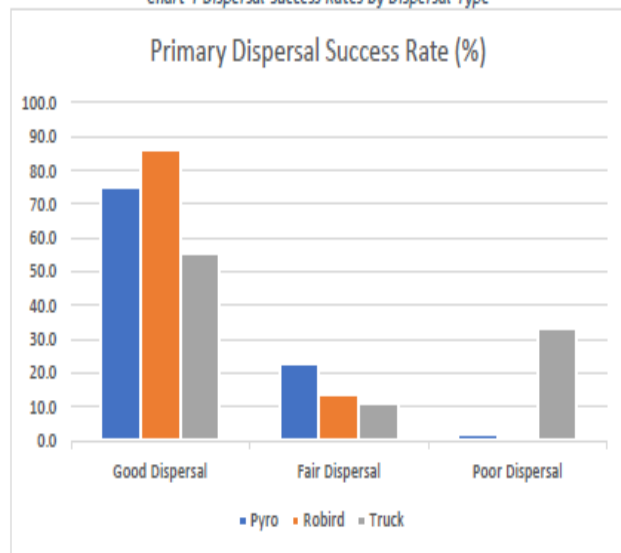
- Silhouette and wing movement
- Bird scaring vs bird controlling
- No habituation
- Vectoring
- Behavioral change

Table 2 Dispersal Success Rates by Dispersal Type

	Primary Dispersal Success Rates (%)		
	Good Dispersal	Fair Dispersal	Poor Dispersal
Pyro	75.0	23.0	2.0
Robird	86.0	14.0	0.0
Truck	55.6	11.1	33.3

2021

Chart 1 Dispersal Success Rates by Dispersal Type



Heat Map



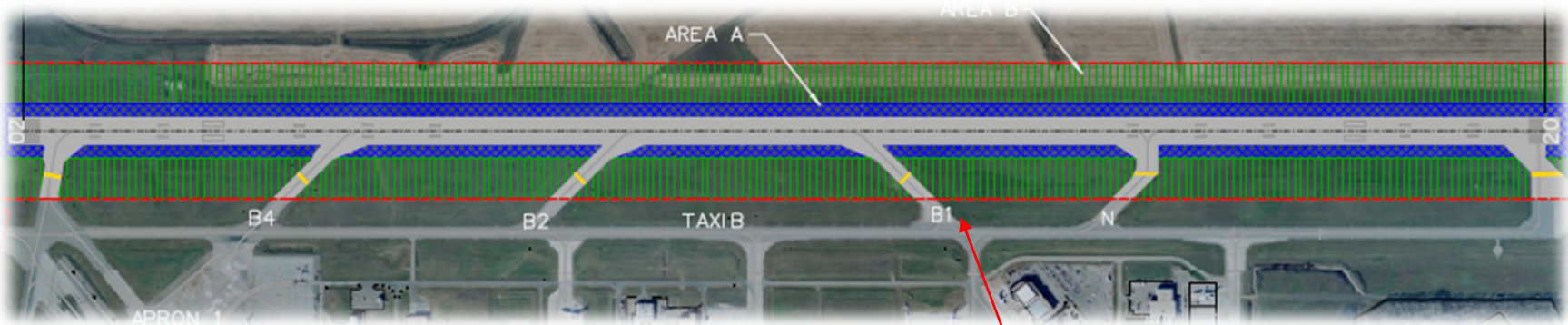
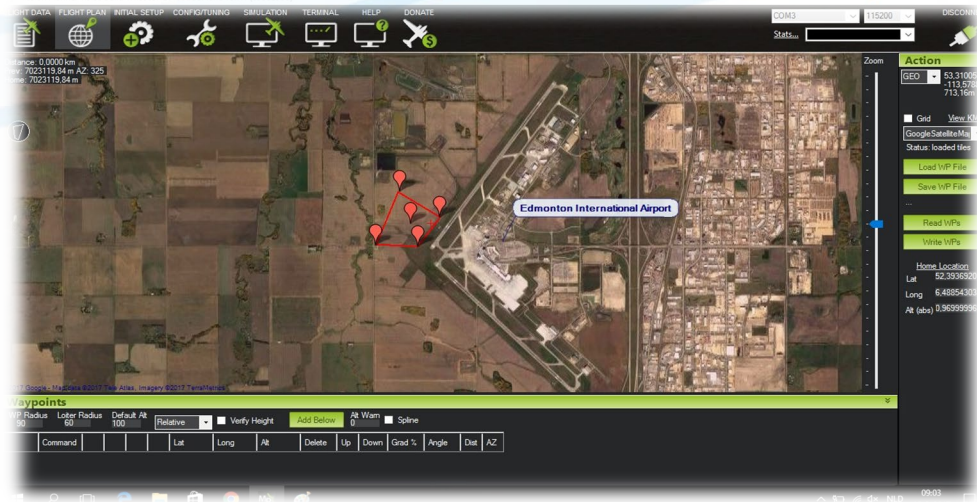
2021 Flight Path Data





Automated fail safe behaviours

- Geo-caging
- Return home
- Emergency stop
- Emergency landing



RUNWAY 02/20 AREAS A & B

Critical Area (Area A):

Equipment and personnel are not permitted within the Critical Portion of the strip (60m from Rwy centerline, 30 meters from Rwy pavement edge) during an aircraft operation, (landing and take-off) on that runway.

Runway Strip (Area B):

Maintenance Equipment and Personnel may be permitted within the Runway Strip portion of Area B (edge of Critical Area A to 150 m mark) during an aircraft operation, (landing and take-off) on that runway.



SAFETY – Safety Case / HIRA Process

- HIRA's – **Hazard Identification Risk Analysis**, conducted for each proposed flight locations.
- Full stakeholder involvement;
- EA, NAV, Airlines, fixed wing, rotary stakeholders.





CYEG: 12/30 West
Airsides AREA 7

Conducted 22-May-18

Initially conducted by: Dean Ervin (EIA)

Reviewed by: Dean Ervin (EIA), Dave Kuny (EIA), Jordan Cicoria (Aerium), Justin Quesnel (Aerium), Mark Anderson (NAV), Patrick Annetts (NAV), Sonja Piccinin (NAV), Justin Quesnel (Aerium), Jul Wojnowski (EA).

RISK MATRIX	
Low	
Medium	
High	

Background
Proposing to utilize the ROBird Peregrine Falcon for wildlife control at YEG. The peregrine falcon is the world's most widespread bird of prey, its breeding grounds ranging from the Arctic to the tropics. They are the fastest animals on Earth, capable of reaching speeds beyond 320 km/h while diving for prey. The peregrine falcon feeds almost exclusively on medium-sized birds such as pigeons, songbirds, waterfowl, etc. It is also known for hunting smaller birds of prey such as kestrels. The Robird version of the peregrine is just as intimidating to birds as the real deal. In flight, the bird population understands that they are living in a dangerous hunting territory, and will take their business elsewhere.

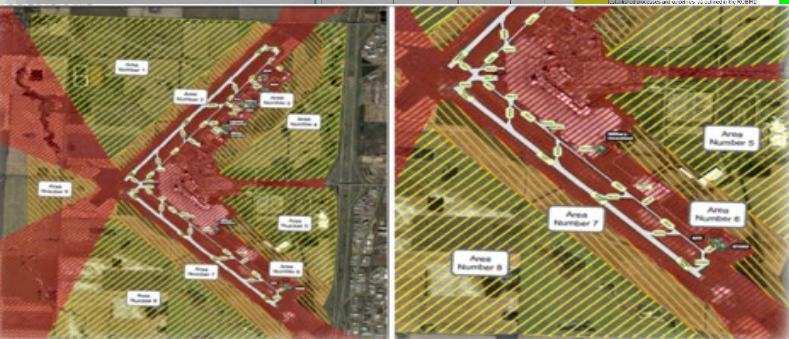
CFS Robird - Key Mission Operational Details

Key Mission Operational Details:

- Resolution: NA
- Overlap: NA
- Area: Within 150m of Pilot
- Altitude: <150ft
- Number of Photos: NA
- Estimated Flight Time: 5 minutes per flight
- Estimated Flight Distance: Mission Dependent
- Working Area Radius: Bound by Geofences
- Working Area Ceiling: 45m (147 feet AGL)
- Communications: Check in with Tower before launch and after landing.
- Security Actions:
 - Geofence breached
 - GPS Loss - Robird circles for 5 seconds to regain GPS signal, if it cannot regain signal, the wings are automatically raised up to landing position and the Robird performs a linear landing insitu.
 - C2 Loss - Transmitter signal loss of any length will send a command for the Robird to Return home.
 - Low Battery
 - Catastrophic Failure



Operational Details	Relevance to Safety	Operational Details	Relevance to Safety	Operational Details	Relevance to Safety	Operational Details	Relevance to Safety
Resolution: NA	Not applicable	Overlap: NA	Not applicable	Area: Within 150m of Pilot	Not applicable	Altitude: <150ft	Not applicable
Number of Photos: NA	Not applicable	Estimated Flight Time: 5 minutes per flight	Not applicable	Estimated Flight Distance: Mission Dependent	Not applicable	Working Area Radius: Bound by Geofences	Not applicable
Working Area Ceiling: 45m (147 feet AGL)	Not applicable	Communications: Check in with Tower before launch and after landing.	Not applicable	Security Actions: <ol style="list-style-type: none"> Geofence breached GPS Loss - Robird circles for 5 seconds to regain GPS signal, if it cannot regain signal, the wings are automatically raised up to landing position and the Robird performs a linear landing insitu. C2 Loss - Transmitter signal loss of any length will send a command for the Robird to Return home. Low Battery Catastrophic Failure 	Not applicable		



			Likelihood									
			Feasible, but unlikely to happen		May happen, but infrequently		Probably will happen, but not as frequently		Likely to occur frequently			
			Annual Frequency	Every 10 to 25 years	Once every 5 to 10 years	Once every 1 to 2 years	1 to 2 times per year	1 to 2 times per year	1 to 2 times per year	1 to 2 times per year	1 to 2 times per year	
			Exposures	1 Person	2 to 5 People	5 to 10 People	6 to 10 People	10 to 20 People	20 to 50 People	50 to 100 People	100 People	
			Descriptor	Inoperable	1 to 5 People	5 to 10 People	10 to 20 People	20 to 50 People	50 to 100 People	100 People	100 People	
				A	B	C	D	E	F	G	H	
Security	Risks, Safety and Security	Regulatory/Environ-ment	Productive Assets	Financial	Consequence	Estimates Risk Management						
	"Loss of life. Life-threatening loss of life."	"Loss results in suspension and/or cancellation or permit, license or approval."	"Loss results in suspension and/or cancellation or permit, license or approval."	"Loss results in suspension and/or cancellation or permit, license or approval."	"Loss results in suspension and/or cancellation or permit, license or approval."	"Loss results in suspension and/or cancellation or permit, license or approval."	"Loss results in suspension and/or cancellation or permit, license or approval."	"Loss results in suspension and/or cancellation or permit, license or approval."	"Loss results in suspension and/or cancellation or permit, license or approval."	"Loss results in suspension and/or cancellation or permit, license or approval."	"Loss results in suspension and/or cancellation or permit, license or approval."	
	"As a result with evidence that it was not detected under protection by protection layer."	"Multiple impacted parties, as well as others, complex recovery."	"Loss results in suspension and/or cancellation or permit, license or approval."	"Loss results in suspension and/or cancellation or permit, license or approval."	"Loss results in suspension and/or cancellation or permit, license or approval."	"Loss results in suspension and/or cancellation or permit, license or approval."	"Loss results in suspension and/or cancellation or permit, license or approval."	"Loss results in suspension and/or cancellation or permit, license or approval."	"Loss results in suspension and/or cancellation or permit, license or approval."	"Loss results in suspension and/or cancellation or permit, license or approval."	"Loss results in suspension and/or cancellation or permit, license or approval."	
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“Key” – Stakeholder Communication



NAV, Tenants, Security, Police, Municipalities

From: Dave Kury
Sent: September 4, 2018 7:11 AM
Subject: Weekly UAV update Sept 4 - Sept 7 2018


Hello everyone,
Here is a weekly update for UAV Operations at EIA from September 4th – September 7th 2018.
Please note the change in start time for the UAV operations of Aerium.
Flying Robird on Air and Ground Side (Zones 1 – 9 on the attached map) operations will be from 8am to 5pm on Tuesday and 7am to 4pm Wednesday to Friday.
There will be a larger emphasis on flying inside and at the Gun Club Pond.

Please see a description of the airframe below


CFS Robird - Key Mission Operational Details

Key Mission Operational Details:

1. Resolution: NA
2. Overlay: NA
3. Area: Within 150m of Pilot
4. Altitude: ~1500'
5. Number of Photos: NA
6. Estimated Flight Time: 5 minutes per flight
7. Estimated Flight Distance: Mission Dependent
8. Working Area Radius: Bound by Distances
9. Working Area Ceiling: 45m (147 feet AGL)
10. Communications: Check in with Tower before launch and after landing.
11. Security Actions:
 - a. Geofence breached
 - b. GPS Loss – Robird circles for 5 seconds to regain GPS signal, if it cannot regain signal, the wings are automatically raised up to landing position and the Robird performs a linear landing mode.
 - c. C2 Loss – Transmitter signal loss of any length will send a command for the Robird to Return home.
 - d. Low Battery
 - e. Catastrophic Failure



Here is the area map for the different zones at EIA and the approved heights for the work.




- Operator will submitted all required NOTAM's.
- Operator has satisfied all regulatory requirements.
- Operator has met all TC, Edmonton Airports and Nav Canada requirement's, approvals are in place.

If you have any questions or concerns please contact me and I can address accordingly.


Thanks
Dave Kury
Superintendent, Regulatory Operations and Airfield Electrical
c: 780 499 8739 f: 780 890 8068
e: dkury@eia.com

Edmonton International Airport
1, 1000 Airport Road
Edmonton International Airport, AB T5E 0V3




Stakeholder Communications

- Developed in collaboration with NAV Canada.
- Continuously revisiting pertinent SOP's for review and revision.
- Communication to airlines and stakeholders “**Key**”, excellent collaboration

EIA Airside Operations		No. SOP/SOG	021-2008
	Title:	Airfield Communication Guidelines	Date Created: Feb 04,08
	Subject:	Procedure For Conducting Safe And Precise Airside Operations Communication.	Revision Date: June 2015
			Review Date: April 7,15
Developed by: Airside Operations		Approved By: Manager Airside Operations	

1.0 POLICY:

Ensure clear and precise communication protocols are utilized while conducting airside operations.

2.0 RATIONALE:

To meet all required communication guidelines while Airside Operations Staff are maneuvering on airside substrates.

3.0 PROCEDURE:

Airside Vehicle Communications Guidelines

Increased aircraft traffic, changes in Transport Canada regulations, new Air Traffic employees and Field Maintenance employees all contribute to communications breakdowns. Procedures which were acceptable in the past are no longer reasonable at a major International Airport.

Communication is imperative to Airside Operations, not only the clear and concise communication but the WHO, WHAT, and WHERE must be communicated. When contacting Ground for permission onto active maneuvering areas, you must clearly identify yourself, state what you're going to do, and where you're going or your intended path. This will assist the Controllers in knowing where and what, and how long you're going to be since they have to keep track of every movement of vehicles on the field. If you leave or intend to do something outside of your original request ensure you communicate it to the Controller.

Remember more information is better than too little!

The following are examples of activities Airside Operations is involved with and communications that should occur.

Example Procedures

When first entering the maneuvering area use "International ground" as the first call then subsequently just "ground" is satisfactory as stated in the Airside Traffic Directives. Here are a few tasks that we do airside with an example of a radio message to get our intentions clarified to the controllers. **Red= Field Maintenance Blue= Ground Control**

1. Back cutting lights on a taxiway, runway, and aprons with a grader and snow blower.

Example- "Ground, Grader 149 plus one on apron two, request permission to proceed on Bravo. We will be back cutting lights on Bravo and the turn offs, holding short of 02-20."

SAFE - RPAS Inspections, Survey...



- Runway Imagery and contours
- Thermal Inspections
- Regulatory Inspection
- Slope and Watershed Analysis
- Settling Pond volumetric's and temperature
- Roofing Inspections
- LiDAR scanning TWY's, RWY's



dji INSPIRE 1



MATRICE 210



mLiDAR
1000

Drone Delivery



Drone Delivery Canada offers a scalable solution to meet all your cargo requirements with our rapidly expanding fleet of drones, powered by our proprietary FLYTE system.



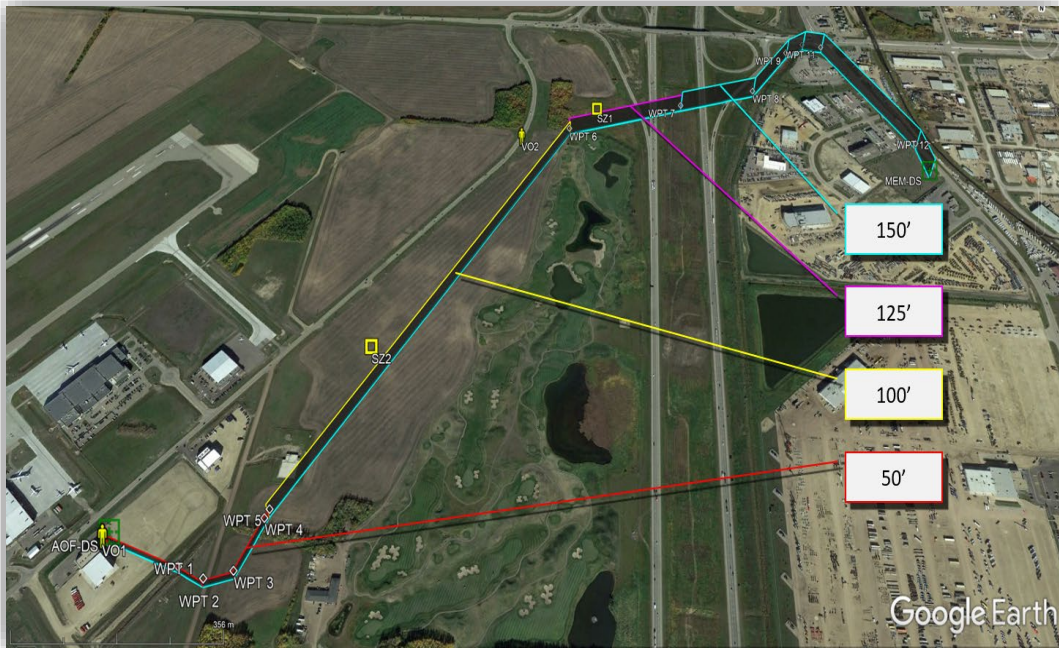
SPARROW

Performance:

Max Speed: 80 kph
Max Range: 30 km
Max Payload: 4.5 kg
MTOW: 25 kg

System Features:

A/C Type: Rotorcraft
Powerplant: Electric
Navigation: GPS-based



AOF Drone Site 1

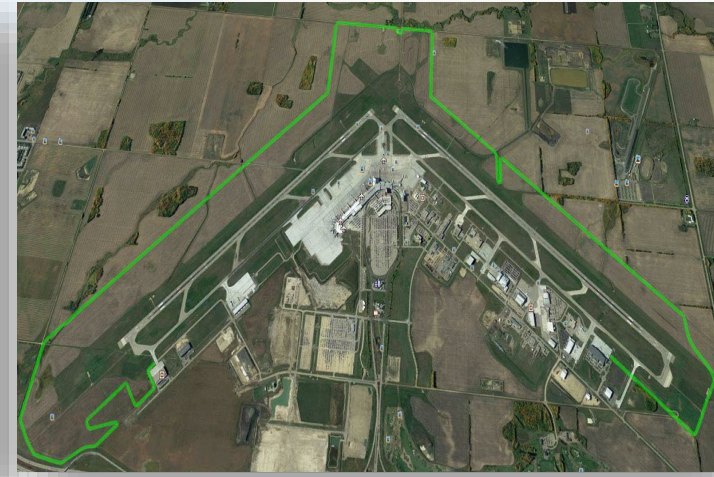


Leduc County Drone Site 2

Autonomous Vehicle – Vision Based Systems

Pan and tilt cameras
– General security
checks

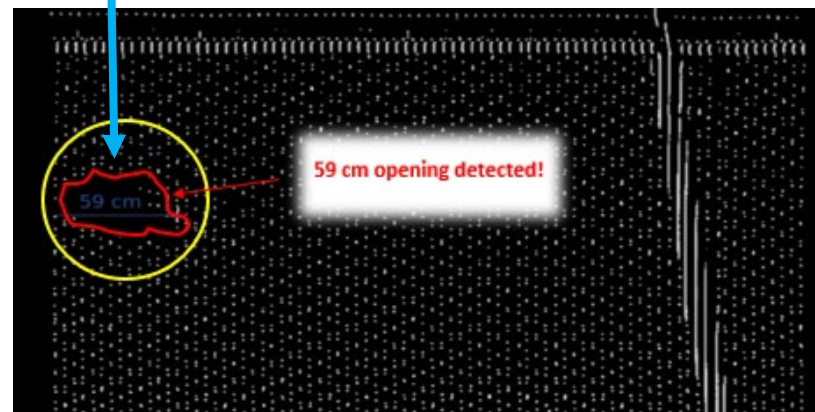
Front facing camera for
human and animal
detection (using artificial
intelligence)



Side cameras for
fence integrity check
(using *artificial
intelligence*)



LiDAR for obstacle detection and
path planning



Runway Markings Analysis

- Runway Markings Report generated from:
 - Orthomosaic generated from drone photo data
 - Machine Learning based off TP312 Rules
- Automated Process

AERIUM ANALYTICS


Skysensus Home Runway Markings

Analysis Details

Status	Job processing completed
Markings Classified:	12
Markings Analysed:	4
Job Analysis Started:	July 12, 2022 17:49:54 PM
Job Analysis Completed:	July 12, 2022 18:00:30 PM

[Redo Analysis](#) [View Report](#)

Runway Markings found:




[Add Classification](#) [Cancel](#) [Redo Analysis](#)

Singleton One

Standards

Report

☒ Display Line Facets
☐ Display Gap Facets




	Computed Length (cm)	Standards Length (cm)	Difference (cm)	Result
0	109.68	80.00	29.68	⊖
1	1210.22	900.00	310.22	⊖
2	111.15	80.00	31.15	⊖
3	1000.38	750.00	250.38	⊖
4	37.43	30.00	7.43	⊖
5	169.94	120.00	49.94	⊖
6	59.70	42.43	17.28	⊖

Foreign Object Debris Detection

Skysensus Home Detected Events


FOD Detection




DATE IP	DATE UTC IP	ALERT NAME IP	ALERT STATUS IP	ALERT STATUS IP
2022-03-04T14:57:15.797970	04 March 2022 14:57:15 PM	FOD Detected	Triggered	OK
2022-03-04T14:55:35.617012	04 March 2022 14:55:35 PM	FOD Detected	Triggered	OK
2022-02-17T21:56:15.215805	17 February 2022 21:56:15 PM	FOD Detected	Triggered	OK

- Replace eyeball Mark 1
- Rapid comprehensive optical coverage
- Enhanced with beyond visual spectrum optics

Detected Item(s)



Location:




Precision Approach Path Indicator (PAPI) Calibration



In Conclusion

Success - Integration of technology into operational aspects of an airport environment is safely achievable and very valuable. Vigilance in ensuring safe, regulatory approved operations at all times, internal, external communication of operations and support is a key factor.

Ensuring real value is being provided (removing the 'cool' or 'neat' factor and making this a practical solution) is essential to the program success.



The Sky's the Limit



FUTURE AHEAD

Thank You

Questions?



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