

NSERC CREATE  
**AUTILI**  
CRSNG FONCER

**Carleton**  
University



CRSNG FONCER  
**AUTILI**  
NSERC CREATE



Natural Sciences and Engineering  
Research Council of Canada

Conseil de recherches en sciences  
naturelles et en génie du Canada

Canada

# What is NSERC CREATE UTILI?

NSERC

**Natural Sciences and Engineering Research Council of Canada**

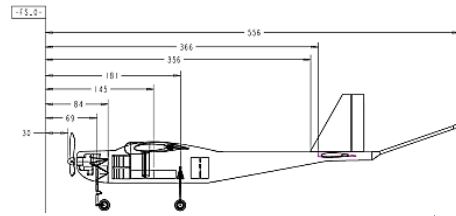
CREATE

**Collaborative Research and Training Experience program**

UTILI

**Uninhabited aircraft systems Trainning, Innovation and Leadership Initiative**

# Carleton University UAS & RPAS Development



GeoSurv I UG Project



Corvus Rook Project

Hammerhead UG Project

GeoSurv II UG Project

SGL CRD | Piper Pawnee

1999



2004



OCE Interact UAV Project

2008

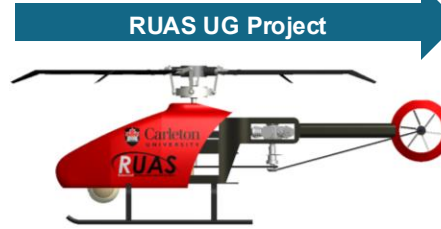


UAS Technologies Phase I

2015-2017



RUAS UG Project



2019+

NSERC CREATE UTILI



# Program Objectives

**Society & the Environment**

**Mission Design & Operations**

**Turning Data into Knowledge**



E. Lanteigne



uOttawa



**Queen's**  
UNIVERSITY



A. Braun



M. Richardson



S. Kenny

**Carleton**  
University 



C. Samson



J. Laliberté



N. Mailhot



S. Shafi



A. Cretu

**UQO**



D. Rancourt



A.L. Desbiens



Université de  
Sherbrooke



Engineering for Industry

ÉCOLE DE  
TECHNOLOGIE  
SUPÉRIEURE

Université du Québec



D. St-Onge



R. Botez

# UTILI – What we do

April 2019 to March 2026

Mandate: to address the training and knowledge challenges associated with UAS / RPAS

Drone training and scholarship program for Master's and PhD students

- 11 active students & 44 alumni

Professional Development

- RPAS and general professional skills courses, seminars, and workshops

Internships

- More than 10 person years program-wide internship contribution

# Partners and Collaborators

## Industry Partners

ACP (Ireland)

Aethon Geomatics

Alietum Ltd.

BAAZ UAV

BC Air Guards

CED/CIDAL

esri Canada

Global UAV Technologies

Hydra Technologies (Mexico)

HyLight (France)

InDro Robotics

ING Robotic Aviation

Laflamme Aéro

MDA/Maxar

Romaeris Corporation

Spiri Robotics

Sumac Geomatics

Terranova Defense

TriStar Multicopters

Tyto Robotics

## Government Departments

Canadian Coast Guard (CCG)

Natural Resources Canada (NRCan)

National Research Council Canada (NRC)

## International Academic Collaborators

Technological University of the Shannon:

Midlands Midwest (Ireland)

Clarkson University (U.S.)

University of Alaska Fairbanks (U.S.)

# UTILI – What we've done

## UAS & RPAS Pilot Certificate

- Basic Operations (100%)
- Advanced Operations (84%)
- Level 1 Complex (4%)
- FAA Part 107 (6%)
- PPL / CPL (8%)

## Mandatory Graduate UAS Course (Carleton University)

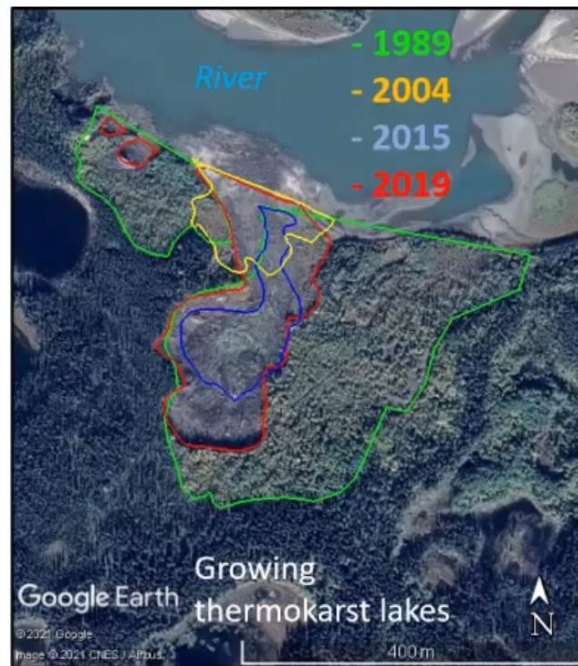
- Began as a training partnership between NAV Canada and Carleton University in 2016
- UAS course offered since 2017
- Over 150 students
- Mission design, operations, risk assessment, modeling, and simulation
- BVLOS, EVLOS, SFOCs, RPAS ORA, JARUS SORA

## Technological challenges addressed by students:

- Permafrost monitoring for First Nations
- Natural disaster information system and seismic activity monitoring
- Canadian airspace modeling for RPAS integration and corridor development
- Design and control of flapping micro air vehicles
- Tail-sitter UAS with stable altitude through vertical-to-horizontal transition
- Landing systems for high-angled icebergs and high-speed vehicles
- Novel automatic weight shifted uninhabited aircraft
- ...and much more

# Frederic Brieger Carleton University

## Permafrost Monitoring for the First Nation of Na-Cho Nyäk Dun, Yukon

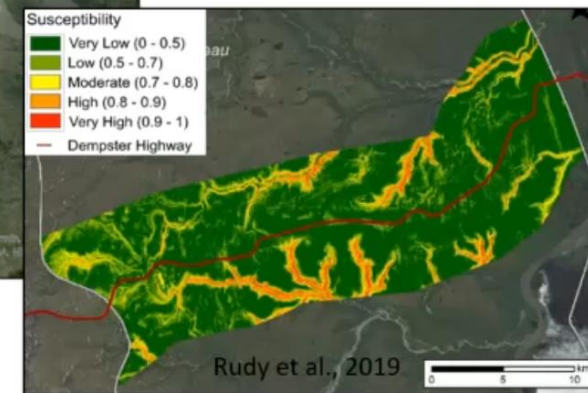


**Local: Geomorphic slump evolution**

**Local: Infrastructure subsidence**

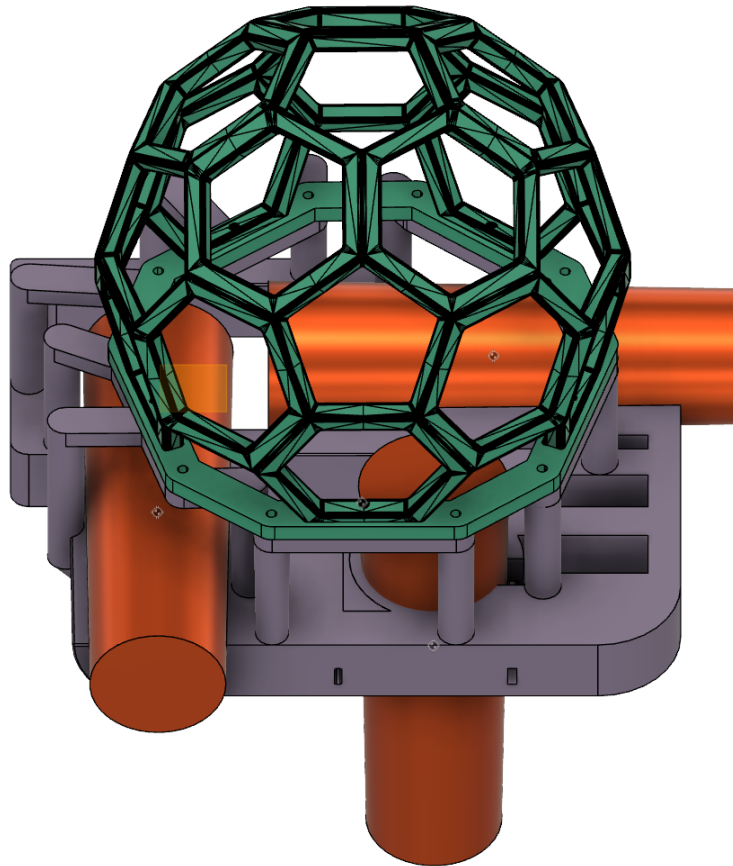


**Regional: Thaw-susceptibility**

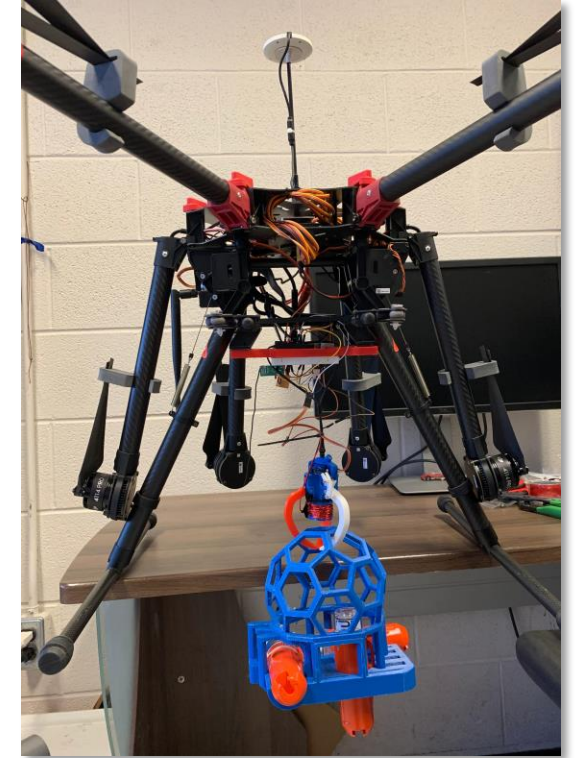


# Robiah Al Warda Queen's University

Natural Disaster Information & Seismic Activity Monitoring System

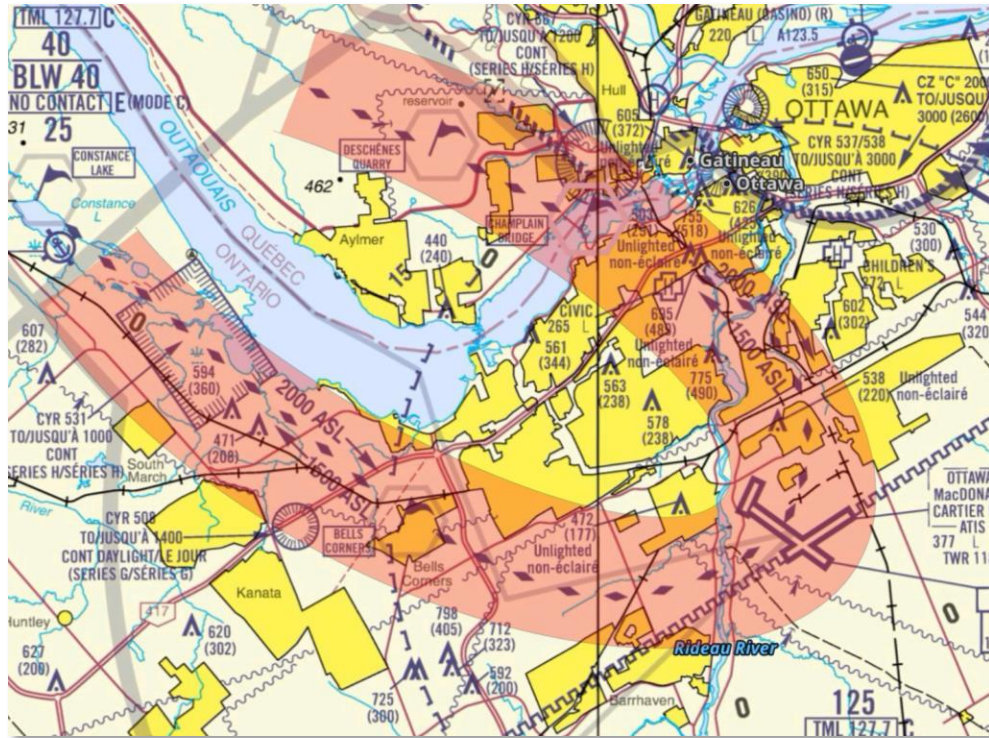


STRYDE Node™

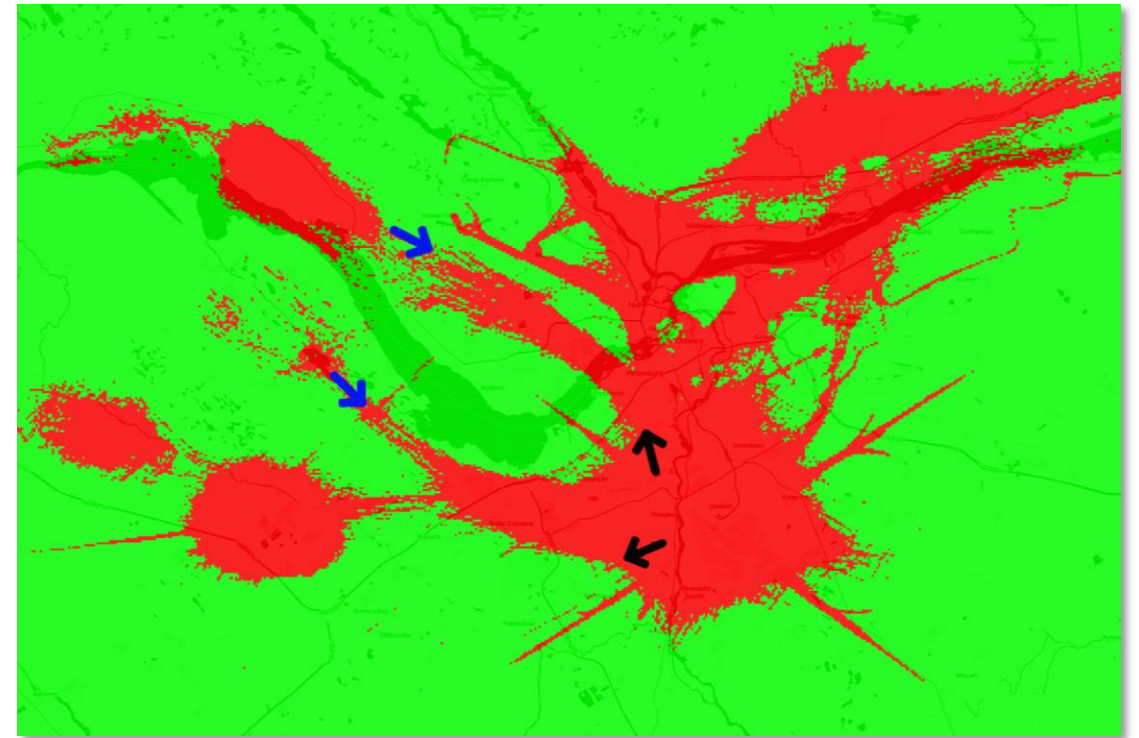


# Nishkarsh Chavda Carleton University

## Air Traffic Density Heatmap for RPAS Corridor Development



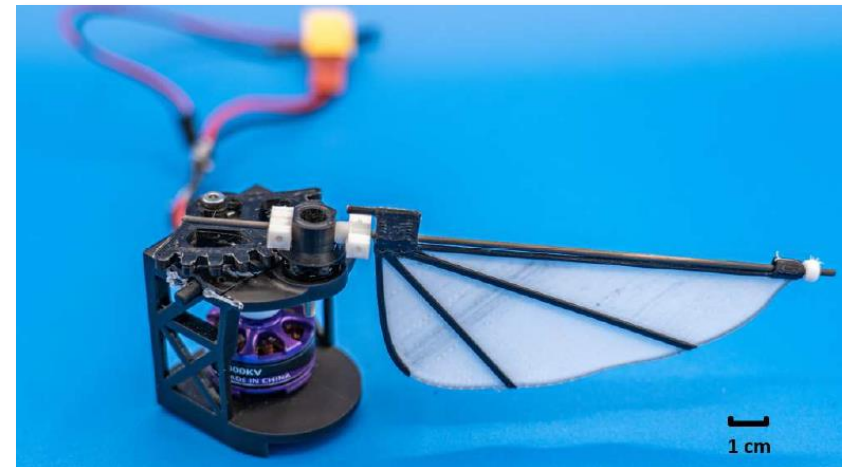
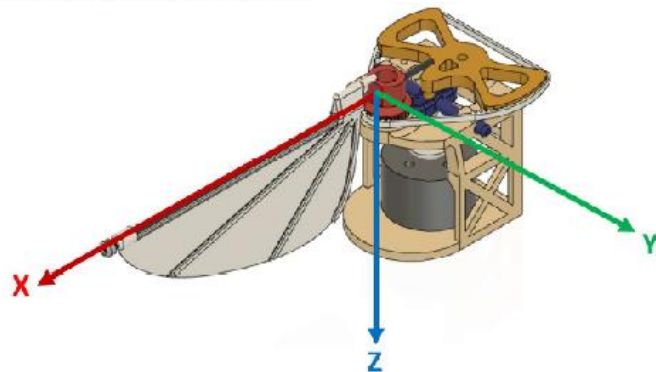
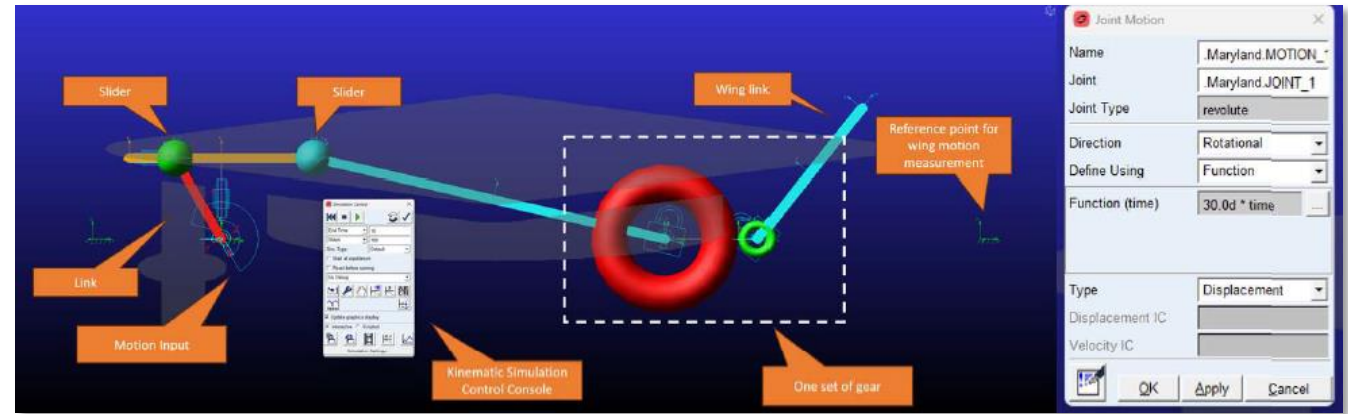
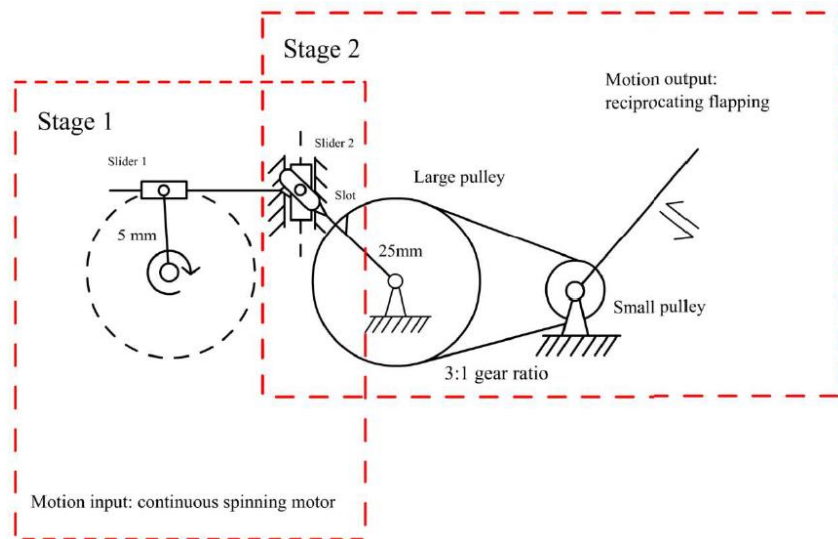
Published VFR Routes – Ottawa International Airport | Scale – 1 : 500,000



Traffic Density Heatmap 1,000 ft ASL – 2,000 ft ASL | Scale – 1 : 25,000

# Boyan Zhou Carleton University

## Flapping Wing Micro Air Vehicle (MAV)



# Trevor Phair University of Ottawa

**SkyReach Aerospace**

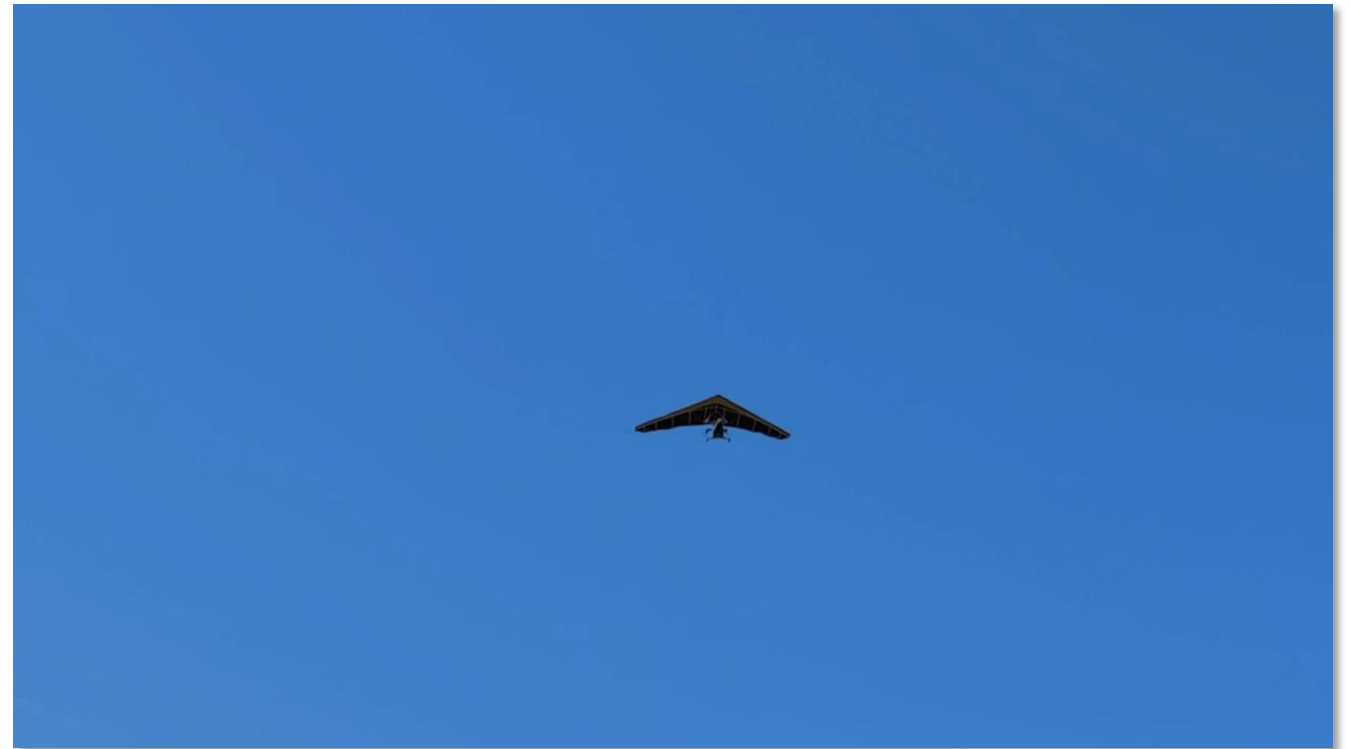


# John Bass & Isaac Tunney Université de Sherbrooke

## Landing a UAV on Icebergs and Glaciers in Iceland



# Automatic Weight-Shift UAS Romaeris Corporation



# Student Success

44 student theses and about 20 journal papers

- Papers published in various IEEE and AIAA peer reviewed journals
- Over 25 conference proceedings

Performance at competitions

J. Bass, *Preliminary Design of a Highly Efficient VTOL System Based on Tethered Fixed-Wing Aircraft*, **75<sup>th</sup> Forum of Vertical Flight Society**, Philadelphia, Pennsylvania, May 2019 (Placed 2<sup>nd</sup> in design competition)

M. Palmer, *Effects of Non-Planar Slicing Techniques and Carbon Fibre Material Additives on Mechanical Properties of 3D-Printed Drone Propellers*, **Aerial Evolution Canada Conference & Exhibition**, Calgary, Alberta, Nov 2022 (Placed 1<sup>st</sup> in student presentation competition)

T. Krings, *Canadian Airspace Modeling*, **Aerial Evolution Canada Conference & Exhibition**, Calgary, Alberta, Nov 2022 (Placed 1<sup>st</sup> in student paper competition)

# 8<sup>th</sup> UTILI Partnership Workshop



## What we heard:

- Meet challenges posed by Canadian winters
- Joint academic-industry test sites and procurement efforts
- Build Canadian component systems suppliers
- Development of pathways for BVLOS operations
- More workshops and broaden regional clusters
- Maintain joint industry-academic training and internships

# Future of UTILI

## Previous model

- Government funded and time limited

## Possible new models

- Funding that blends industry and public programs
  - Mitacs: \$15k per 4 months, 50% industry, 50% government
  - Flexible student internships
  - Universities and companies working together
- Consortium with membership fees
- New CREATE
  - Supply chain resilience
  - Airspace integration
  - CUAS



Through our targeted pursuit of  
**\$1–3 billion in targeted investment**  
over the next 5 years, this initiative stands to:

- Create **thousands of high-value JOBS**
- Attract **billions in NEW INVESTMENT**
- Enhance Canada's **SOVEREIGN CAPABILITIES.**
- Strengthen our position among **NATO ALLIES.**

<https://www.investottawa.ca/dihub/>

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<https://carleton.ca/utili/>

Salman Shafi, MSc  
salmanshafi@cunet.carleton.ca

Nathaniel Mailhot, PhD  
nathanielmailhot@cunet.carleton.ca