

# Dr. Oscar Lin's Current Research Projects

Project I: UAVs Processing and MAS for Situation  
Awareness and Uncertainty Assessment

Project II: AI-Powered Adaptive Online Learning Systems

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Graduate Students Orientation

Nov. 8, 2024

<https://oscar.athabascau.ca>

# Project I: UAVs Processing and MAS for Situation Awareness and Uncertainty Assessment

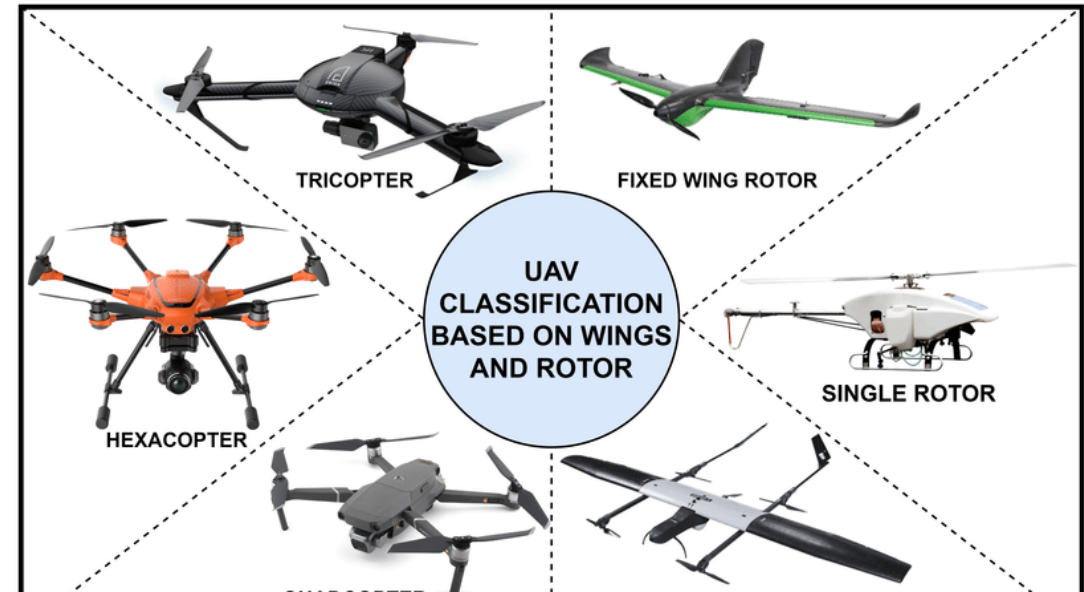
- Major Innovation Fund



<https://oscar.athabascau.ca>

# Goal 1

- Algorithms to coordinate a fleet of UAVs distributed optimization problems.
- Multiagent deep reinforcement learning (MADRL)



# Goal 2

An interactive, immersive multi-UAV operation training environment, a distributed cyberlearning environment. This environment will combine or integrate the computer-based virtual mode and the physical mode, enabling from personalized and collaborative team-based training.



# Goal 3

Algorithms to assess uncertainty, to analyze data (i.e., hyperspectral imagery) using remote sensing to address problems in real-world

## UAV Technology Today

The image displays seven distinct applications of UAV technology, each represented by a small square image with a white border and a blue background. The applications are arranged in two rows. The top row contains four images: a white quadcopter in flight, a yellow and black quadcopter with a camera, a yellow quadcopter flying over a fire, and a yellow quadcopter over a field. The bottom row contains three images: a black quadcopter over a topographic map, a black quadcopter near wind turbines, and a 3D topographic map with a green overlay. Each image is labeled with its respective application name in white text on a blue background.

- Earth Science
- Transportation
- Rescue Operations
- Agriculture
- Geology
- Inspections
- 3D Mapping

Pictures from  
www.bing.com/images/

## Team

- Students
  - Wilson Hau
  - Leo Howard
  - Raymond Morland
- Collaborators
  - University of Calgary
  - UAV companies

# Project II: AI Powered Adaptive Online Learning Systems



Title: Eliciting Adaptive Sequences for Online Learning



Funding Agency: NSERC, Alberta Innovates, AU



Goal: to enable future online learning systems to provide adaptively altering learning sequences of content and activities in real time that will best fit the student's needs and knowledge states. Such systems are expected to make student learning not only easier but also far more efficient.



Methods: Reinforcement Learning, Knowledge Graphs, Simulation, Empirical study, GenAI,

# Team members

- Students
  - Raymond Morland
  - Gagan Jhajj
  - Adam Zieleman
  - Hongxin Yan
  - ...
- Professors
  - Waseda University in Japan
  - Liwa Collage, UAE
  - St. Mount Vincent University
  - Other profs of AU