Motivation

- Simulation use is widespread and increasing
- Strategic importance for Canada (world’s largest manufacturer)
- Carleton leadership in simulation education and research
Limitations of current devices

- Cannot reproduce extreme flight manoeuvre accurately, e.g., stall, spin
- Actuator limits of platform
Objective

- To develop a unique, state-of-the-art, complete, and flexible simulation facility at Carleton
  - Novel motion platform
  - Reconfigurable
  - Full sensory cueing
  - HLA compliant (IEEE 1516)
Carleton University Simulator Project - CUSP

Atlas Simulator Facility

Software
- In-house developed distributed computing environment (CUSP Simple Infrastructure - CSI)
- Interface to X-plane flight simulation software

Sphere
- 9.5 foot composite spherical capsule is integral to the actuation system
- Self-contained computing and pilot interface components
- Pilot experiences immersive flight simulation

Angular Actuation
- 3 powered 8 inch mecanum wheels provide unbounded rotation
- 24 passive mecanum wheels support the capsule in all directions

Translational Actuation
- 3 orthogonal translations provided by commercial MOOG stewart-gough platform
- Capable of developing high acceleration using 6 prismatic actuators and 3 passive pneumatic struts
2018-2019 team includes
- 2 BIO MECH
- 11 MECH
- 1 AERO A
- 2 AERO C
- 1 AERO D
2018 / 2019 Overview

• Structures
  – Design and analysis of structural component
  – Ex: Sphere, upright structure, wheels

• Actuation
  – Dynamic modelling
  – Pneumatics
  – Visual orientation

• Controls
  – Orientation systems
  – Internal hardware components
  – Overhaul system architecture
  – Motion implementation
• For additional information
  – Web: http://cusp.mae.carleton.ca
  – Instagram: @cusimulator
  – Project manager: John.Hayes@carleton.ca; tel. 5661
  – Contact current CUSP students or lead engineers
  – Winter design review: April 6, 09:00-18:00, University Centre