

Andrew F Ilersich

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Education

- 2021-Now** PhD in Aerospace Engineering (candidate)
University of Toronto Institute for Aerospace Studies (UTIAS)
Supervisor: Dr. Prasanth Nair (UTIAS)
- 2019-2021** MSc in Aerospace Engineering
University of Toronto Institute for Aerospace Studies (UTIAS)
Co-supervisors: Dr. Masayuki Yano (UTIAS), Dr. Adam Steinberg (Georgia Tech)
- 2014-2019** BSc in Engineering Science, Major in Aerospace, Minor in Robotics
University of Toronto Faculty of Applied Science and Engineering

Publications

- 2024** Andrew F. Ilersich and Prasanth B. Nair. Deep learning with Gaussian continuation. *Foundations of Data Science*, 2024
- 2023** Andrew F. Ilersich and Suraj Bansal. Conceptual aerodynamic design considerations for a fixed-wing microgravity UAV. In *AIAA Aviation 2023 Forum*. AIAA, June 2023
- 2022** Andrew F. Ilersich, Kyle A. Schau, Joseph C. Oefelein, Adam M. Steinberg, and Masayuki Yano. Augmenting covariance estimation for ensemble-based data assimilation in multiple-query scenarios. *Combustion Theory and Modelling*, 26(6):1041–1070, 2022
- 2021** Andrew F. Ilersich, Kyle A. Schau, Joseph C. Oefelein, Adam M. Steinberg, and Masayuki Yano. Reducing the cost of ensemble-based data assimilation in multiple-query scenarios through covariance augmentation. In *AIAA Propulsion and Energy 2021 Forum*. AIAA, July 2021
- 2019** Andrew F. Ilersich and Christopher J. Damaren. Spacecraft attitude control by magnetic actuation and double-gimbal variable-speed control moment gyroscope. *Undergraduate Thesis*, May 2019
- 2014** Anna Taddio, Andrew F. Ilersich, Anthony N. Ilersich, and Jenny Wells. From the mouth of babes: Getting vaccinated doesn't have to hurt. *Canadian Journal of Infectious Diseases and Medical Microbiology*, 25:470261, Jan 2014

Awards and Distinctions

- 2025** Engineering Science Teaching Assistant Award for AER406 (see Work Experience)
- 2024-2025** Queen Elizabeth II Graduate Scholarship in Science and Technology - \$5000/semester
- 2024** UTIAS Molson Kenneth Fellowship (declined) - \$2000

2023-2024	Queen Elizabeth II Graduate Scholarship in Science and Technology - \$5000/semester
2022	International Small Wind Turbine Contest at TU Delft (Netherlands) - First Place
2022	University of Toronto Aerospace Team - Technical Excellence Award
2020-2021	Ontario Graduate Scholarship - \$5000/semester
2014-2018	University of Toronto Dependents' Scholarship for Academic Achievement - \$3000/year
2018	Second Annual International Drone Competition for the Youth (China) - Third Place
2018	Association for Unmanned Vehicle Systems Intl. Contest (USA) - Sportsmanship Award
2017	Unmanned Systems Canada UAV Competition (Canada) - Grand Prize
2014	University of Toronto Entrance Scholarship - \$5000

Work Experience

Jan - Apr 2021-22, '25	University of Toronto, Toronto, ON <i>Teaching Assistant for AER406 (Aircraft Design)</i> Instructed students on the aircraft design process with a model airplane design challenge. Students learned aerodynamic and structural design skills, as well as how to build and flight test their airplanes. Won the departmental teaching assistant award (see Awards and Distinctions).
Sept 2024 - Jan 2025	University of Toronto, Toronto, ON <i>Teaching Assistant for AER407 (Spacecraft Design)</i> Instructed students on the spacecraft design process, using a low-Earth orbit spacecraft recovery mission as an example. Students learned systems design within strict constraints imposed by launch provider, communications systems, and regulations.
Jan 2023 - Apr 2023	University of Toronto, Toronto, ON <i>Course Instructor for ROB313 (Introduction to Learning from Data)</i> Taught machine learning at an introductory level to a class of ~60 third-year robotics engineering students. Prepared and delivered lectures, assignments, and examinations, starting from linear models and working up to neural networks.
Sept 2019 - Jan 2020	University of Toronto, Toronto, ON <i>Teaching Assistant for AER210 (Vector Calculus and Fluid Mechanics)</i> Instructed microfluidics lab and graded lab reports for ~100 students. Taught students safe handling of fluids and how to collect data on local fluid velocity by tracking fluorescent beads under a microscope.
May 2018 - Aug 2018	Drone Delivery Canada, Toronto, ON <i>Aerodynamicist</i> Worked at Drone Delivery Canada on the Robin and Sparrow quadrotors. Designed aerodynamic shells for minimizing drag and correcting yaw instability. Developed rudimentary flight dynamics models of the quadrotors and assisted with flight testing under the supervision of Transport Canada.
May 2017 - Apr 2018	Bombardier Aerospace - deHavilland Site, Toronto, ON <i>Aircraft Simulation Engineer</i> Worked at Bombardier Aerospace on the Global and Q400 programs. Validated simulation results with flight test data, developed tools to partially automate model tuning. Rewrote sections of flight dynamics model based on computer predictions to reflect changes to design.

Research Experience

Sept 2021 - Present - University of Toronto Institute for Aerospace Studies, Toronto, ON
Doctoral Candidate - Graduate Thesis

Developing machine-learning techniques to characterize the space of realistic solutions to physical systems governed by differential equations. This is usually done using example solutions, termed “snapshots,” but I am also investigating the possibility of finding this directly from the governing equations. With such a restricted solution space, solutions to computationally-demanding problems can be found far more quickly. Supervisor: Prof. Prasanth B. Nair (UTIAS).

Sept 2019 - Aug 2021 - University of Toronto Institute for Aerospace Studies, Toronto, ON
Master of Applied Science (MASc) Candidate - Graduate Thesis

Developed techniques to assimilate experimental data into mathematical models of fluid flow. I applied these techniques to combustion simulation for the purposes of jet engine design and analysis. These can be used to produce better estimates of flow conditions or to refine the model for better performance when data are not present. Supervisors: Prof. Masayuki Yano (UTIAS) and Prof. Adam Steinberg (Georgia Tech). Research presented at AIAA Propulsion & Energy Forum and published in Combustion Theory & Modelling (see Publications).

Sept 2019 - June 2023 - University of Toronto Institute for Aerospace Studies, Toronto, ON
Independent Student Researcher

Independently researched optimal design of a small airplane capable of carrying payload and simulating a zero-gravity environment. Developed a design methodology based on aerodynamic simulation that maximizes zero-gravity time and stability. Research presented at AIAA Aviation Forum (see Publications).

Aug 2017 - Sept 2019 - Flight Research Laboratory, National Research Council, Ottawa, ON
Student Researcher

Independently designed reduced-gravity experiment for a parabolic jet. Funded by the 2016 Canadian Reduced Gravity Experiment (CAN-RGX) student research award (see ‘Research Funding’). Examined and modelled how viscous fluid jets coil like a rope when impacting a plate. This work was continued into the microgravity UAV project (see above).

Sept 2018 - Apr 2019 - University of Toronto Institute for Aerospace Studies, Toronto, ON
Student Researcher - Undergraduate Thesis

Designed and evaluated a proposed spacecraft attitude control system consisting of a combination of magnetic actuation (MA) and a control moment gyroscope (CMG). Simulated detumbling and pose-holding scenarios. Derived effective bounds on the MA control gains given the CMG control gains and demonstrated superior performance to pure MA system. Supervisor: Dr. Chris Damaren (UTIAS). See Publications.

Sept 2017 - Apr 2018 - University of Toronto Institute for Aerospace Studies, Toronto, ON
Student Researcher

Studied the tradeoff between spectral radius and truncation error of summation-by-parts finite difference operators. Demonstrated that weighted optimization of spectral radius and error does not produce more efficient operators than optimizing for error alone, which is current standard practice. Supervisor: Dr. David Zingg (UTIAS).

- May 2016 -** University of Toronto Institute for Aerospace Studies, Toronto, ON
Aug 2016 *Student Researcher*
- Performed simulations of fluid flow for two projects: airfoil optimization with prediction of laminar-to-turbulent flow transition, derivation/implementation of flow boundary values for modelling turbofan engines. Supervisor: Dr. David Zingg (UTIAS).
- May 2015 -** York University Lassonde School of Engineering, Toronto, ON
Aug 2015 *Student Researcher*
- Modelled distribution of carbon molecules in polymer matrix and how the molecules shift when the matrix becomes a foam. Developed computer simulation to evaluate thermal and electrical conductivity. Supervisor: Dr. Siu Ning Leung (York University).

Research Funding

- 2016** Canadian Space Agency (CSA), National Research Council (NRC), & SEDS (Canada)
Canadian Reduced Gravity Experiment (CAN-RGX)
- Won funding as a student team to perform an experiment aboard the NRC's parabolic jet, where an experiment in viscous fluid mechanics was performed (see 'Research Experience'). Featured in UofT News: <https://bit.ly/2r6AxcP>
- 2016** National Science & Engineering Research Council (Canada)
Undergraduate Student Research Award
- Won funding for research in geometry optimization and fluid mechanics at the University of Toronto Institute for Aerospace Studies under Prof. David Zingg for the summer of 2016 (see 'Research Experience').

Community & Volunteer Activities

- Sept 2023 -** Student Experience Committee, UTIAS
Mar 2024 *Student Representative*
- Participated in the development of a UTIAS-wide student survey to distill key areas of dissatisfaction with student experience. Developed recommendations which were then provided to the UTIAS faculty.
- Sept 2022 -** Re-Election Campaign for Councillor Mike Colle, Ward 8, Toronto
Oct 2022 *Volunteer Data Analyst*
- Joined the campaign to re-elect Mike Colle as councillor for Ward 8, Toronto. Worked as a data analyst, identifying neighbourhoods by strong and weak levels of support for Colle in order to direct door-to-door campaigning efforts. Advocated for and brought about changes to campaign strategy in this regard. Also joined door-to-door efforts with other campaign volunteers.
- Nov 2020 -** University of Toronto Wind Power Club (UTWind), University of Toronto
June 2022 *Cofounder, Vice President, Aerodynamics Lead*
- Cofounded a club to compete at the International Small Wind Turbine Design Contest. Built club infrastructure including branding and recruitment and secured initial funding. Led the aerodynamic design of turbine blades and external housing, producing a wind turbine that won first place at the contest (see Awards and Distinctions). Featured in UofT News: <https://bit.ly/3bFXsW9>

- Aug 2020 - Apr 2023** - University of Toronto Aerospace Team, University of Toronto
Fixed-Wing Aircraft Design Specialist, Aerodynamics Lead
 Aerodynamicist and fixed-wing aircraft designer to the new UAS (Unmanned Aerial Systems) division of the Aerospace Team. Worked on airframe design and mentoring junior members on aerodynamics, computer-aided design, and fabrication techniques. The aircraft compete at the SAE Aero Design student competition.
- Sept 2015 - April 2020** - University of Toronto Project Holodeck, University of Toronto
Founder, President
 Founded the virtual/augmented reality design club. Led meetings, designated roles, and secured ~\$4000 in annual funding. Developed haptic-feedback gloves, an all-direction treadmill, and a handheld 3D scanner for environment modelling. Built an “arcade machine” for public exhibition of games and tech developed by the club.
- Sept 2018 - May 2019** - University of Toronto Aerospace Team, University of Toronto
Advisor, Multirotor Aircraft
 Advisor on multirotor aircraft design to the UAV (Unmanned Aerial Vehicle) division and Aerial Robotics division of the Aerospace Team. Mentor to junior members on aerodynamics, structural mechanics, fabrication techniques, flight testing, and Transport Canada certification.
- Jan 2016 - Sept 2018** - University of Toronto Aerospace Team, University of Toronto
Project Lead, Multirotor
 Project Lead for the UAV division’s multirotor aircraft. Designed and built an original airframe, worked with team members on flight control systems. This airframe continued to be used as the UAV division’s main multirotor for over a year after I left. Competed annually at Unmanned Systems Canada and Association of Unmanned Vehicle Systems International.
- Sept 2010 - Aug 2015** - Hospital for Sick Children
Volunteer Research Assistant
 Participated in data gathering and data analysis for research into minimizing distress during vaccination. Designed and deployed apps to aid in recording data from interviews with patients. Assisted in writing research abstract and preparing online education materials. Co-authored manuscript (see Publications).

References

- Dr. Prasanth Nair** Professor at the University of Toronto Institute for Aerospace Studies
 prasanth.nair@utoronto.ca
 Relationship: Doctoral supervisor (see Education & Research Experience)
- Dr. Masayuki Yano** Professor at the University of Toronto Institute for Aerospace Studies
 masa.yano@utoronto.ca
 Relationship: MSc co-supervisor (see Education & Research Experience)
- Dr. Adam Steinberg** Professor at the Georgia Institute for Technology
 adam.steinberg@gatech.edu
 Relationship: MSc co-supervisor (see Education & Research Experience)

Dr. Peter Grant	Professor at the University of Toronto Institute for Aerospace Studies peter.grant@utoronto.ca Relationship: Course instructor for AER406 (see Work Experience)
Dr. Chris Damaren	Professor at the University of Toronto Institute for Aerospace Studies chris.damaren@utoronto.ca Relationship: Course instructor for AER407 (see Work Experience)
Dr. Alis Ekmekci	Professor at the University of Toronto Institute for Aerospace Studies ekmekci@utias.utoronto.ca Relationship: Course instructor for AER210 (see Work Experience)