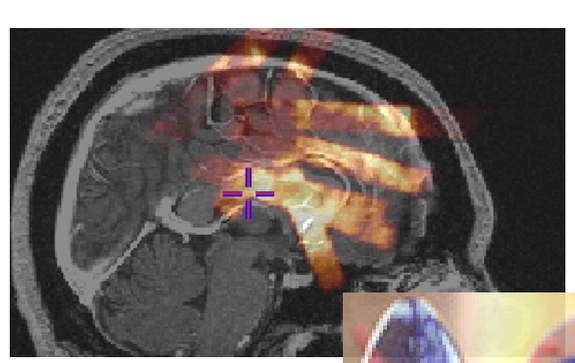
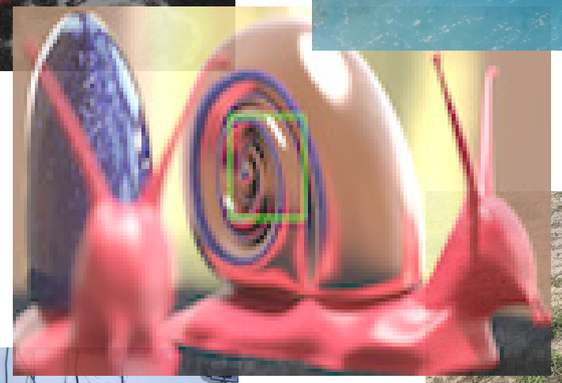
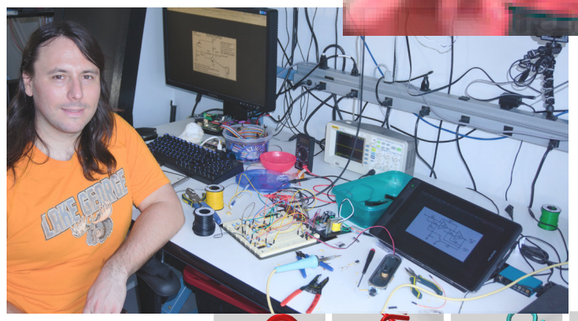
Centre for Intelligent Machines

Annual Report 2021

CIM CENTRE FOR INTELLIGENT MACHINES







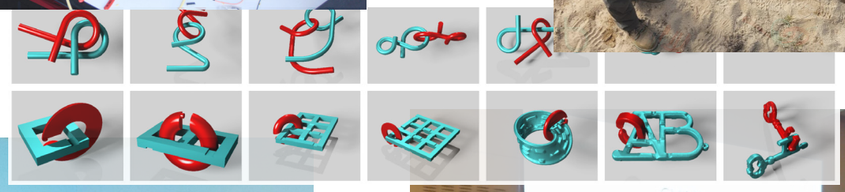


Table of Contents

Message from the Director

The last academic year was witness to a cautiously optimistic return to on-campus teaching and research activities, with a momentum that we hope to carry on through the next academic year. Here, I was happy to witness a similar return to research activities at CIM and am excited for the more comprehensive return that awaits us in the fall.

Following closely behind our fall return, on-campus colloquia and social events at CIM will rekindle our sense of community in a manner sorely missed during the age of Zoom. I'm especially keen to finally meet those Associate and Full CIM members we had the pleasure of onboarding (albeit remotely) during the course of the pandemic.

This coming year will bring with it a suite of important financial and infrastructural initiatives. Building atop of the support we garnered across the Faculty of Science and Faculty of Engineering, we will continue to pursue an ambitious growth project targeting candidate spaces on the main and MacDonald campuses for large-scale robotics, AI and systems research. Here, we are working in cadence with faculty and departmental leadership, as well as with the Office of the Vice-Principal (Research and Innovation), to mount a compelling and competitive portfolio for the next Canada Foundation for Innovation infrastructure competition. We are pairing this medium-term plan with targeted short-term renewal projects, including ongoing clean-out and restocking projects for labs in our main McConnell wing, as well as more intricate local infrastructure projects (e.g., cooling, ventilation and furniture). As with our CFI initiative, these projects could not have come to fruition without the unwavering support of leadership and staff in our two Faculties.

Speaking of staff, 2022 - 2023 will also bring movement in this regard.

I am thrilled to congratulate Chelsea Rogers, our Head of Communications, on her forthcoming maternity leave.

CIM Director Derek Nowrouzezarai

We will undoubtedly miss her cheerful presence during this time and — on behalf of the CIM members and staff — we wish her a pleasant and fulfilling leave. I want to commend Chelsea's efforts on establishing our new website, our beautiful new logo and centre branding, as well as the newsletters we have happily grown accustomed to receiving during the pandemic. Congratulations to you and your (growing) family, Chelsea!

In a similar light, Nick Wilson, our IT Specialist, has recently decided to pursue a new career outside of CIM and McGill. Nick has supported the Centre's operations for many years and — since the unexpected absence of our IT Lead, Jan Binder — he has also grown to meet those leadership tasks otherwise managed by Jan. Nick will be missed, and we mirror his excitement for the many new adventures that await him along his evolving career journey. Nick will remain at the Centre in a part-time capacity as we work to hire new IT staff to continue delivering tailored IT services to our community. Best of luck with the next chapter in your career, Nick: we'll be cheering for you by the sidelines!

During these transitions, Marlene will continue to lead the administrative, financial and operational portfolio of the Centre, as we grow our coordination with Faculty administration while continuing to pursue IT hiring initiatives. Marlene has continued to work diligently in support of the many aforementioned operational and planning exercises, including overseeing resource management, and helping with shouldering much of the facility-facing database coordination normally handled by Jan.

Finally, the Centre's recently-minted Industrial Liaison Program was fully deployed during 2021 - 2022 and we have now been solicited by a half-dozen potential industrial partners. We hope to onboard many of these candidates to the program in the coming calendar years.

I want to join our staff in welcoming you all back to campus, and I look forward to running into you in our hallways and our on-campus events.

Centre Governance

Day-to-day operation of the Centre's activities, management of its finances, allocation of space and other resources, are carried out by the Centre's Director, assisted by the Centre support staff.

The Centre is advised by the Centre's Board, which meets yearly to review the Centre's activities and budget, and to provide guidance on strategic planning.

2021 Board Members

Derek Nowrouzezahrai — Centre Director, Board Chair

James Nicell — Dean, Faculty of Engineering

Bruce Lennox — Dean, Faculty of Science

Christopher Manfredi — Provost & Vice Principal, Academic

Martha Crago — Vice Principal, Research and Innovation

Gregory Dudek — Centre Member

Frank Ferrie — Centre Member

Kaleem Siddiqi — Alternate Centre Member

Pierre Breton — External Member, Executive Vice President, KWI Polymers

Mohamad Afsari — Graduate Student

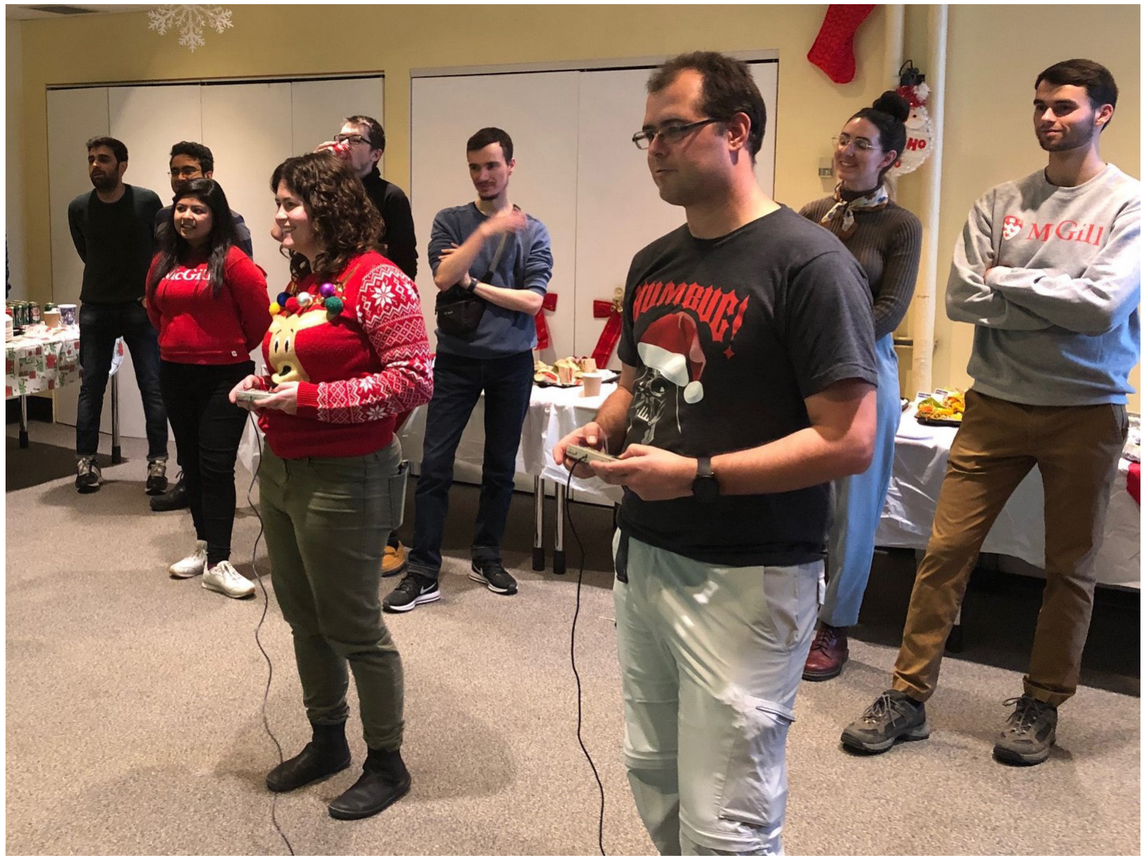
Support Staff

Marlene Gray — CIM Manager

Jan Binder — Systems Manager (on leave)

Nick Wilson —Systems Administrator

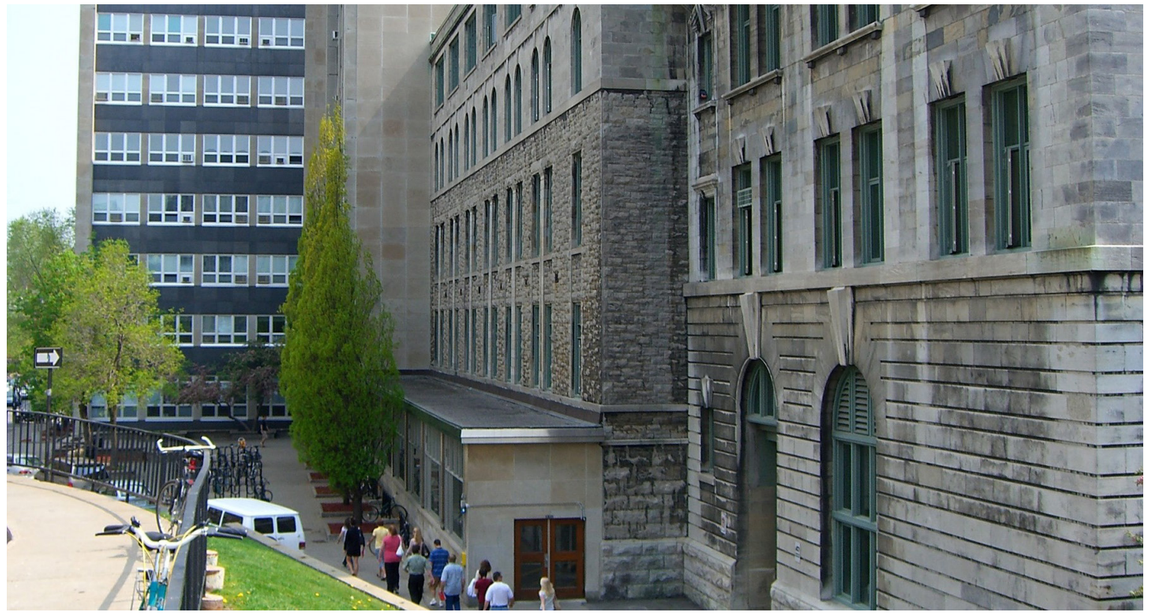
Chelsea Rogers —Communications Associate



Chelsea and Nick engaged in a fierce tetris battle at the holiday team building event

Overview of Centre

The McGill Centre for Intelligent Machines (CIM) is a multidisciplinary, inter-departmental, inter-faculty research group formed in 1985 to facilitate and promote research on intelligent systems and provide an enriched mentoring and training environment for graduate students studying in the field of robotics and intelligent systems.



For more than three decades, CIM has been a pioneering force in cross-disciplinary research. The Centre is primarily located in contiguous space where labs and student offices are shared. CIM's membership and students have been universally recognized over the years for their highest standards of excellence — exceptional scientific achievements and outstanding contributions to society and industry. Intelligent systems and machines are capable of adapting their behaviour by sensing and interpreting their environment, making decisions and plans, and then carrying out those plans using physical actions.

The members of CIM seek to advance the state of knowledge in such domains as — robotics, artificial intelligence, computer vision, medical imaging, haptics, systems and control, computer animation and machine and reinforcement learning.

The Centre is comprised of 26 full members from both the Faculties of Engineering and Science — the Department of Electrical and Computer Engineering, Department of Mechanical Engineering and the School of Computer Science. CIM also has associate members representing a diversity of research collaborations, such as within the Faculty of Medicine, the Royal Victoria Hospital and the Montreal Neurological Institute.

The Centre is home to a diverse population of researchers: in addition to the 26 full members, at the end of 2021 the centre boasted a complement more than 300 graduate students, post-docs and undergraduate students, as well as visiting scholars, research assistants and associates from various disciplines.

Full Members

Derek Nowrouzezahrai
Associate Professor, Centre Director
Electrical and Computer Engineering
Computer Graphics

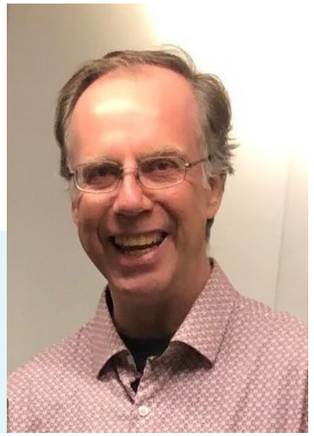
Jorge Angeles
Emeritus Professor
Mechanical Engineering
Robotics and Mechanisms

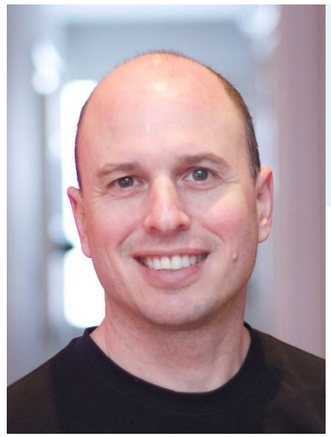
Tal Arbel
Professor
Electrical and Computer Engineering
Computer Vision and Medical Image Analysis

Benoit Boulet
Professor
Electrical and Computer Engineering
Systems and Control

Peter Caines
Distinguished James McGill Professor
Electrical and Computer Engineering
Systems and Control

James Clark
Professor
Electrical and Computer Engineering
Computer Vision





Jeremy Cooperstock
Professor
Electrical and Computer Engineering
Human-Computer Interaction

Gregory Dudek
Distinguished James McGill Professor
School of Computer Science
Robotics and Computer Vision

Frank Ferrie
Professor
Electrical and Computer Engineering
Computer Vision

Jozsef Kovecses
Professor
Mechanical Engineering
Robotics and Aerospace Systems

Paul Kry

Associate Professor

School of Computer Science

Computer Graphics

Michael Langer

Associate Professor

School of Computer Science

Computer Vision

Martin Levine

Emeritus Professor

Electrical and Computer Engineering

Computer Vision

Aditya Mahajan

Associate Professor

Electrical and Computer Engineering

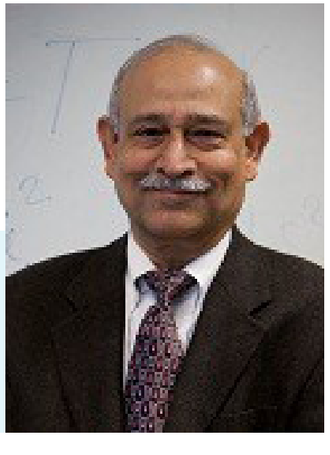
Systems and Control

David Meger

Assistant Professor

School of Computer Science

Robotics and Computer Vision



Arun Misra

Professor

Mechanical Engineering

Dynamics and Control

Hannah Michalska

Associate Professor

Mechanical Engineering

Systems and Control

Meyer Nahon

Professor

Department Chair
Mechanical Engineering

Robotics and Aerospace Systems

Joelle Pineau

Associate Professor, William Dawson Scholar

School of Computer Science

Machine Learning

Inna Sharf

Professor

Mechanical Engineering

Robotics and Aersopace Systems

Kaleem Siddiqi

Professor

School of Computer Science

Computer Vision and Medical Image Analysis

Paul Zsombor-Murray

Associate Professor (Post-Retirement)

Mechanical Engineering

Robotics and Mechanisms

Associate Members

Adamchuk, Viacheslav – Associate Professor, Bioresource Engineering, McGill University

Armandfard, Narges – Assistant Professor, Electrical & Computer Engineering, McGill University

Cecere, Renzo – Associate Professor, Cardiac Surgery (RVH), McGill University

Cheung, Jackie Chi Kit – Assistant Professor, School of Computer Science, McGill University

Collins, Louis – Professor, Biomedical Engineering, McGill University

Dimitrakopoulos, Roussos – Professor, Mining Engineering, McGill University

Hamann, Marco – Professor, Math/Informatics, Dresden University of Applied Sciences

Hayward, Vincent – Professor, ISIR, Université Pierre et Marie Curie, Paris France

Husty, Manfred – Professor, Geometry and CAD, University of Innsbruck, Austria

Liu, Xue – Associate Professor, School of Computer Science, McGill University

Mongrain, Rosaire – Associate Professor, Mechanical Engineering, McGill University

Panangaden, Prakash – Professor, School of Computer Science, McGill University

Pike, Bruce – Professor, Faculty of Medicine, University of Calgary

Precup, Doina – Associate Professor, School of Computer Science, McGill University

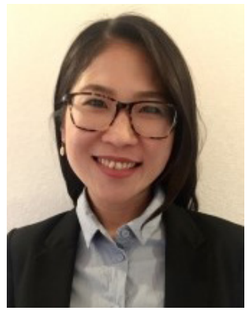
Zhao, Yaoyao Fiona – Associate Professor, Mechanical Engineering, McGill University

Welcome to our newest Associate member, Fiona Zhao

Department of Mechanical Engineering

Dr. Zhao's research interests lie predominantly in manufacturing information technologies for the integration of design, manufacturing processes, and sustainability assessment.

CIM is pleased to welcome four new Full members



Hsiu-Chin Lin

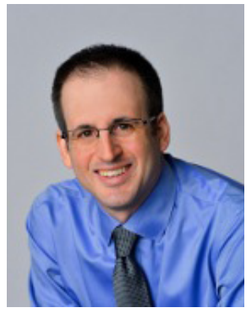
School of Computer Science & Department of Electrical and Computer Engineering

Prof. Hsiu-Chin Lin is joining CIM as a Full member. Her research is in the fields of robotics and machine learning for motor control. Prof. Lin's research interests focus on enabling robots to assist humans in everyday activities by studying motion-based control, optimization, and robot motion especially for robot arms and quadruped robots.

AJung Moon

Department of Electrical and Computer Engineering

Prof. AJung Moon is the director of the McGill Responsible Autonomy & Intelligent System Ethics (RAISE) lab and is joining CIM as a Full member. Prof. Moon investigates how robots and AI systems influence the way people move, behave, and make decisions in order to inform how autonomous intelligent systems can be designed and deployed more responsibly.



Warren Gross

James McGill Professor, Department of Electrical and Computer Engineering

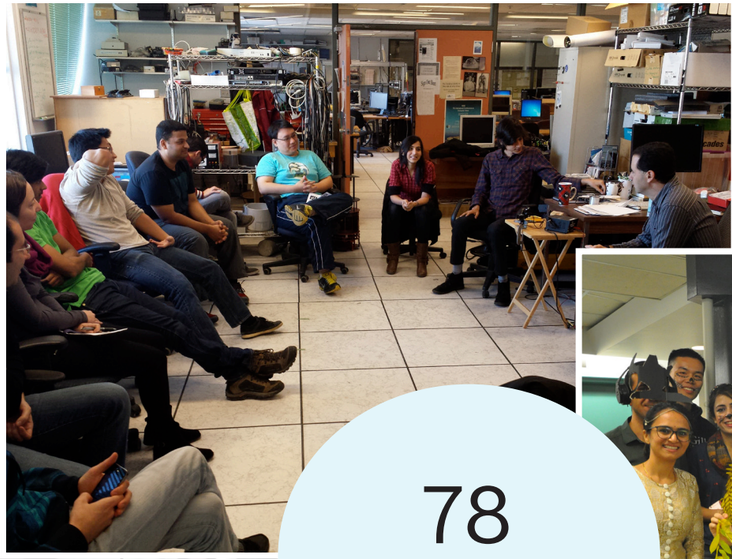
Prof. Warren Gross is joining CIM as a Full member, following many years as an Associate Member. He is currently the Chair of the Department of Electrical and Computer Engineering, McGill University. His research interests are in the design and implementation of signal processing systems and custom computer architectures.

James Richard Forbes

William Dawson Scholar, Department of Mechanical Engineering

Prof. James Richard Forbes is joining CIM as a Full member, following many years as an Associate Member. His reserach group is the DECAR systems group which conducts fundamental and applied research on state estimation (navigation), guidance, and control. Problems in air, ground, marine, space, and manipulator robotics are of particular interest to the DECAR systems group.

Students



78
Ph.D.s

23
Postdocs

99
Masters

Seminars

Name	University	Location	Title
François Pomerleau	Université Laval	Canada	Résultats de la première participation canadienne au prestigieux DARPA Subterranean Challenge
Mehran Mesbahi	University of Washington	USA	First Order Methods for Control Synthesis
Fatemeh Zand	HEC Montreal	Canada	Impacts of government direct limitation on pricing, greening activities and recycling management in an online to offline closed loop supply chain
Ricardo D. Ribeiro	King Abdullah University of Science and Technology (CEMSE-KAUST)	Saudi Arabia	MFG Price Models with Common Noise
Naci Saldi	Özyegin University	Turkey	A Topology for Policies in Stochastic Teams and Existence of Optimal Policies
Joelle Pineau et al.	McGill University	Canada	Homecoming: AI and the Future of Public Policy
Silvère Bonnabel	University of New Caledonia and Mines ParisTech	France	Geometric Filtering and Autonomous Navigation
Nima Akbarzadeh	McGill University	Canada	Restless Bandits: Indexability, Whittle Index Computation and Learning

Jayakumar Subramanian	Media and Data Science Research Lab at Adobe	India	Two Reinforcement Learning Problems from Healthcare and Generative Social Science
Peter M. Kort	Tiburg University	Netherlands	Double marginalization and external financing: Capacity investment under uncertainty
Mohamad Kazem Shirani Faradonbeh	University of Georgia	USA	Adaptive Linear-Quadratic Regulators
Artem Sedakov	Saint Petersburg State University	Russia	A model of river pollution as a dynamic game with network externalities
Ping Sun	Saint Petersburg State University	Russia	Stable networks and dynamic network formation with group partitioning
Margaret P. Chapman	University of Toronto	Canada	Risk-Sensitive Safety Analysis via Conditional Value-at-Risk
Arka Mukherjee	HEC Montreal	Canada	The impact of product recall on advertising decisions and firm profit while envisioning crisis or being hazard myopic
Jesús Marín Solano	Universitat de Barcelona	Spain	Groundwater extraction for irrigation purposes: The case of asymmetric players
Vivek Borkar	IIT Bombay	India	Graph-constrained dynamic choice
Ratul Lahkar	Ashoka University	India	Affirmative action in large population contests
Xiao Huang	Concordia University	Canada	Buyer direct financing under supplier disruption risk
Margarida Carvalho	Université de Montréal	Canada	Interdiction games on graphs
Catherine Laporte	Ecole de technologie supérieure	Canada	Ultrasound imaging: let's talk
Philip Paré	Purdue University	USA	Epidemic Spread with Transportation: Modeling, Inference, and Control
Guiomar Martín-Herrán	Universidad de Valladolid	Spain	Investment in cleaner technologies in a transboundary pollution dynamic game. A numerical investigation

Nathalie Ayi	Sorbonne University (Paris)	France	Mean-field and Graph Limits for Collective Dynamics Models with Time-varying Weights
Doina Precup	McGill University	Canada	Artificial Intelligence and the Future of Reason
Alessandra Buratto	University of Padova	Italy	Optimal adaptation of lockdown measures upon the introduction of a COVID-19 vaccination campaign
Prashant G. Mehta	University of Illinois at Urbana-Champaign	USA	What is the Lagrangian for Nonlinear Filtering?
Jafar Chaab	HEC Montreal	Canada	Dynamic pricing and advertising in the presence of strategic consumers and social contagion: A mean-field game approach
Kai Cui	Technical University of Darmstadt	Gemany	Approximately Solving Mean Field Games via Entropy-Regularized Deep Reinforcement Learning
Anna Jaskiewicz	Wroclaw University of Science and Technology	Poland	Quasi-hyperbolic discounting in Markov decision processes
Jun Liu	University of Waterloo	Canada	Formal Methods for Nonlinear Control: A Robustness Perspective
Marc G. Bellemare	Google Brain in Montreal	Canada	Autonomous navigation of stratospheric balloons using reinforcement learning
Alexander L. Fradkov and Boris R. Andrievskii			Synchronization and State Estimation of Nonlinear Physical Systems under Communication Constraints
Jr-Shin Li	Washington University in St. Louis	USA	Control of Inhomogeneous Dynamic Ensembles
Michèle Breton	HEC Montreal	Canada	The impact of safety covenants in syndicated loan agreements
Marie Laclau	HEC Paris	France	Robust communication on networks
Katerina Stankova	Maastricht University	Netherlands	Improving treatment of metastatic cancer through game theory
Fabio Coppini	Université de Paris	France	Weakly Interacting Particles on Dense Graph Sequences

Kaiqing Zhang	University of Illinois at Urbana-Champaign	USA	Provable reinforcement learning for multi-agent and robust control systems
Maxime Descoteaux	Sherbrooke University	Canada	A journey on your brain highways: diffusion MRI and connectomics of the future
Joao Saude	Systems and Robotics Institute in Lisbon	Portugal	Mean-field Games Models of Price Formation
Régis Chenavaz	KEDGE Business School	France	Advertising, goodwill, and the Veblen effect
Dengwang Tang	University of Michigan	USA	Dynamic Games among Teams with Asymmetric Information
Pegah Rokh Foroz	University of Tehran, Iran, and ETH Zurich, Switzerland	Iran & Switzerland	Incentive mechanism design using linear matrix inequality approach
Dena Firoozi	HEC Montreal	Canada	LQG Mean Field Games with a Major Agent: Nash Certainty Equivalence versus Probabilistic Approach
Massimiliano Ferrara	Mediterranea University of Reggio Calabria	Italy	Fuzzy fractional-order model of the novel coronavirus: The impact of delay strategies on the pandemic dynamics model with nonlinear incidence rate
Asuman Ozdaglar	MIT	USA	Analysis and Interventions in Large Network Games
Fouad El Ouardighi	ESSEC Business School	France	Control of an epidemic with endogenous treatment capability under popular discontent and social fatigue
Rabih Salhab	Institute for Data, Systems, and Society (IDSS), MIT	USA	Social Learning under Behavioral Assumptions
Florian Wagener	University of Amsterdam	Netherlands	All symmetric equilibria in differential games with public goods
James Richard Forbes	McGill University	Canada	Optimal Control of Quadrotors on the Matrix Lie Group of Double Direct Isometries SE_2(3)

Awards

Prof. Tal Arbel is a current Canada CIFAR AI Chair, MILA, awarded by the Canada CIFAR AI Chairs Program, January 1, 2020 (ends on January 1, 2025).

Members of the Probabilistic Vision Group led by Prof. Tal Arbel received a Best Paper Award for their work: B. Nichyporuk. J. Cardinell, J. Szeto, R. Mehta, D.L. Arnold, S.Tsaftaris and T. Arbel, "Cohort Bias Adaptation in Federated Datasets for Lesion Segmentation", In Proceedings of the 3rd MICCAI Workshop on Domain Adaptation and Representation Transfer (DART) held in conjunction with the 24th International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI 2021), held virtually (Strasbourg, France), September 2021. Lecture Notes in Computer Science, Springer, Vol. 12968, pp. 101-111, 2021. The team was awarded an Nvidia RTX 3090 GPU.

Prof . Arbel won an Audience Award for Best Short Oral Presentation for "Common limitations of performance metrics in biomedical image analysis" at the 4th Conference on Medical Imaging with Deep Learning (MIDL 2021), held virtually from Lubeck, Germany on July 7-9, 2021. The authors were A. Reinke, M. Eisenmann, M. Dietlinde Tizabi, C. H. Sudre, T. Radsch, M. Antonelli, T. Arbel, S. Bakas, M. J. Cardoso, V. Cheplygina, K. Farahani, B. Glocker, D. Heckmann-Natzel, F. Isensee, P. Jannin, C. E. Kahn, J. Kleesiek, T. Kurc, M. Kozubek, B. A. Landman, G. Litjens, K. Maier-Hein, B. Menze, H. Maller, J. Petersen, M. Reyes, N. Rieke, B. Stieltjes, R. M. Summers, S. A. Tsaftaris, B. van Ginneken, A. Kopp-Schneider, P. Jager, and L. Maier-Hein.

Professor Peter Caines continues to hold the following honors: FRSC, FIEEE (Life Fellow), FIMA (UK), FSIAM, FCIAR, FIFAC.

Members of the Dynamics Estimation Control of Aerospace and Robotic (DECAR) Systems Group, led by Prof. James Richard Forbes, won best student paper award finalist (1 of 4 finalists) at the International Conference on Robotics and Automation (ICRA) for the paper:

M. Shalaby, C. C. Cossette, J. L. Ny, and J. R. Forbes, "Cascaded Filtering Using the Sigma Point Transformation," IEEE Robotics and Automation Letters, vol. 6, no. 3, pp. 4758-4765, 2021. Jointly accepted to ICRA.

The Ph.D. thesis of Prof. Jozsef Kovecses's student Albert Peiret won the Lagrange Award of IFToMM Springer's Multibody System Dynamics journal. It was presented at Eccomas Thematic Conference on Multibody Dynamics, Dec. 12-15, 2021.

Prof. Kovecses received the Medal of the Czech Technical University (CTU Medal) in 2021. The in-person presentation of the Medal was planned for Oct. 2021, but he was not able to attend the ceremony in Prague that time. Another ceremony will be scheduled for this year.

One of Prof. Kovecses's papers published in 2020 ranked among the top 10 papers of the ASME Journal of Computational and Nonlinear Dynamics for 2020-2021.

Prof. Aditya Mahajan was a keynote Speaker at the 5th International Conference on Information Systems and Computer Networks (ICSON'21) in Oct 2021.

Prof. Mahajan presented an invited Departmental Seminar in Electrical and Computer Engineering at the University of Waterloo in June 2021. He also presented an invited Departmental Seminar in Computer and Software Engineering at Polytechnique Montreal in June 2021.

Prof. Mahajan gave the following invited seminars and conference papers:

Invited Workshop Seminar on Reinforcement Learning and stochastic control of queues at WiOpt in Oct 2021.

Invited Workshop Seminar on Workshop on mean-field games on networks at the Fields Institute in Oct 2021

Invited Workshop Seminar on Workshop on Agents behavior in combinatorial game theory, CRM, Nov 2021

Invited Workshop Seminar, Machine Learning and mean-field games, Nov 2021

Invited Conference Paper, IEEE Conference on Decision and Control, Dec 2021

Invited Conference Paper, IEEE Indian Control Conference, Dec 2021

Prof. AJung Moon was interviewed for a podcast by RedHat. Saron Yitbarek on Dec 1, 2021. The topic was "Robot Revolution" on the podcast Command Line Heroes.

Prof. Moon also organized an open source roboethics competition API that allows anyone with basic coding skills to implement ethical design of a simulated robot.

Prof. Meyer Nahon has a Google Scholar h-index of 41, total citations >6000 - among the highest in the Department of Mechanical Engineering.

Prof. Derek Nowrouzezahrai was an

honourary headline speaker at the Toronto Geometry Colloquium - Season 3, Session 10 (November 26, 2021).

Prof. Nowrouzezahrai was an invited showcase panelist at the Conseil Québécois du Commerce de Détail's TAG conference on the future of retail and artificial intelligence on November 3, 2021.

Prof. Nowrouzezahrai presented a spotlight paper "Regularized Inverse Reinforcement Learning" by Jeon, W., Su, C., Barde, P., Doan, T., Nowrouzezahrai, D. and Pineau J. published in the 9th International Conference on Learning Representations, ICLR 2021.

Prof. Nowrouzezahrai was promoted to the Creative Destruction Lab's Scientist panel in their Supply Chain stream.

He is the first full-time tenure-track faculty member from the Faculty of Engineering to be appointed as a Core Academic Faculty member in the Quebec Artificial Intelligence Institute (Mila).

Prof. Nowrouzezahrai is also the first full-time tenure-track faculty member from the Faculty of Engineering to be elected to the Scientific Council of the Quebec Artificial Intelligence Institute (Mila).

He was selected by leadership at the Quebec Artificial Intelligence Institute -- after broader consultations with the Mila community, the Mila Scientific Council, and Mila industrial partners -- to serve as the university-facing organizer (in coordination with an industry-facing organizer) of this year's Mila TechAide Charity Conference. This conference has historically garnered significant and broad attendance and attention, having raised hundreds of thousands of dollars for the TechAide charitable foundation.

Prof. Joelle Pineau received an outstanding Paper Award at ACL 2021 (top international conference for Natural Language Processing) for "Unnatural language inference", K Sinha, P Parthasarathi, J Pineau, and A Williams. K. Sinha and P. Parthasarathi are PhD students under her supervision at McGill.

Prof. Kaleem Siddiqi received an NSERC Discovery Accelerator Supplement (DAS) for 04/2018 – 03/2021, for his research on "Diffusion and Geometry in Biological Tissue". He is the principal investigator and this is his second DAS.

Associate Member Prof. Prakash Panangaden was named Milner Lecturer, Distinguished Lecture Series, at the U. of Edinburgh.

Prof. Panangaden was also elected Fellow of the Association of Computing Machinery.

Prof. Panangaden won a best paper award at the Ninth Conference on Algebra and Coalgebra in Computer Science (CALCO), in Salzburg, Austria, 2021 for the paper by G. Bacci, R. Mardare, P. Panangaden, and G. Plotkin. "Tensor of Quantitative Equational Theories."

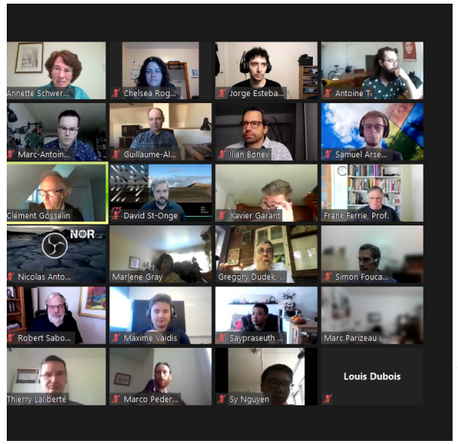
Industrial Partnerships

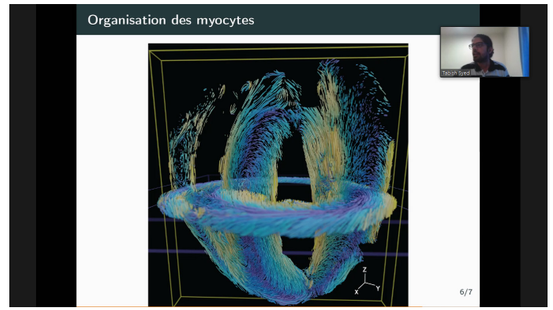
The Industrial Affiliates Program provides companies with access to students for recruiting purposes as well as a way to keep up-to-date on the exciting research going on in the Centre. Industry partners are invited to CIM's Student Research Showcase events and a CV bank is being developed to facilitate the recruitment of students.

The following companies are among those who have partnered with CIM as industrial affiliates or have collaborated with CIM researchers on research projects or contracts.

REPARTI

The regroupement REPARTI - Systèmes cyberphysiques et intelligence machine matérialisée (Cyberphysical Systems and Embedded Machine Intelligence) (April 2019 - March 2025) is a $2.9M inter-institutional, interdisciplinary collaborative venture comprised of six Quebec institutions, 50 members and over 400 students and post-doctoral researchers. The McGill node of REPARTI is represented by 17 members from the McGill Centre for Intelligent Machines (CIM). The members of the McGill node collaborate in grants and contracts valued in excess of $5M annually. This





FRQNT regroupement is a primary funding source for the McGill Centre for Intelligent machines.

The institutions participating in REPARTI are: Université Laval (host institution), McGill University, Université de Sherbrooke, École Polytechnique, Université de Montréal, and École de technologie supérieure (ÉTS).

Supported by the Quebec government's Fonds de recherche Nature et technologies (FQRNT), this regroupement stratégique builds on some unique precedents:

The historical and concrete partnership that developed over the past 25 years between prominent researchers in U. Laval and McGill (CIM) as a result of the NSERC National Centres of Excellence program, the interuniversity-industrial consortium IRIS-Precarn, and the FQRNT Réseau QERRAnet.

The long and productive relationship established between the McGill Centre for Intelligent Machines (CIM) and the Quebec government through the former FCAR Centre de recherche programme.

The regroupement REPARTI has been renewed twice, in 2013 and 2019, to continue a long tradition of excellence in research.

Funding Sources

An important source of funding is the Natural Sciences and Engineering Research Council of Canada (NSERC). This federal funding includes a wide variety of programs such as Discovery Grants, Engage Grants, Collaborative Research and Development Grants among others. Some programs include industrial contracts which allow researchers to work with companies to solve existing problems or innovate to create new technologies.

Provincial programs also play in important role. In addition to funding REPARTI, the Fonds de recherche du Québec – Nature et technologies (FRQNT) also provides funding to individual CIM members for their research activities. Several members are part of other Regroupement Strategiques including GERAD and CIRMMT, which gather researchers from many institutions to further common research goals within certain thematic areas.

MITACS is an innovative program that pairs companies with students seeking research experience. It provides funding for projects that enable companies to hire post-secondary students who gain real-world experience and help solve industry challenges.

NCRN NSERC Canadian Robotics Network RCRC Réseau canadien de robotique du CRSNG

The NSERC Canadian Robotics Network (NCRN) is a Canada-wide network which brings together academic, government, and industrial researchers in the area of field robotics, to develop the science and technologies to eventually allow teams of heterogeneous robots (on land, in the air, on the surface of or under water) to work collaboratively in outdoor environments, and to communicate critical information to humans who operate them or use them.

The NCRN network management is hosted by McGill and CIM, with CIM member Greg Dudek serving as scientific director. CIM members Inna Sharf and David Meger are also part of the NCRN.

Funding

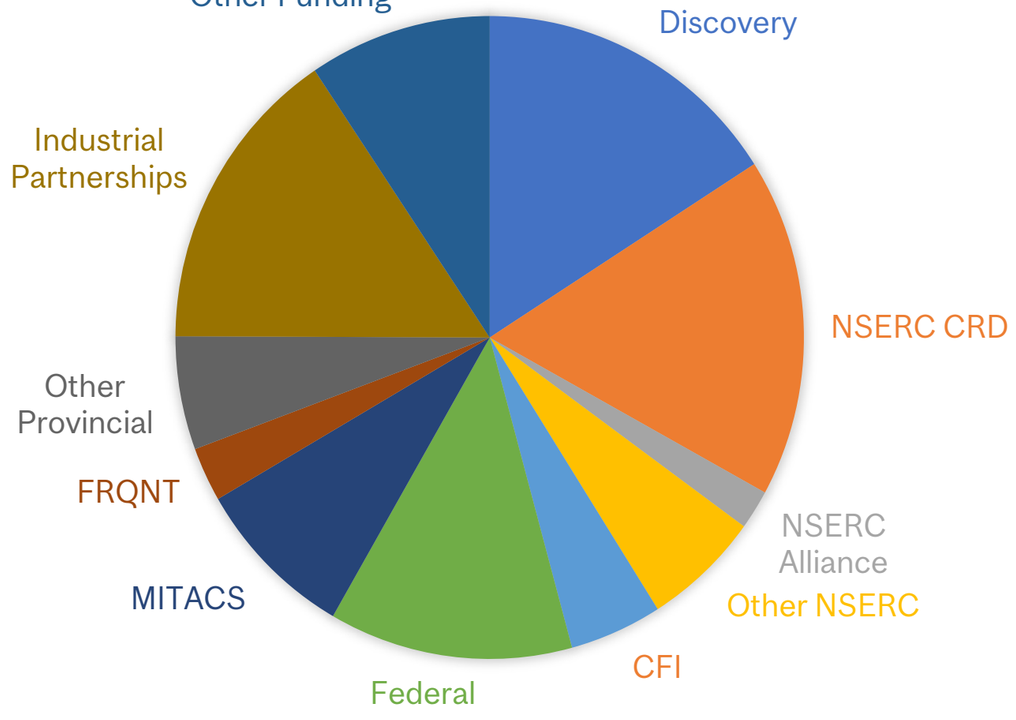
CIM receives funding from a variety of sources including federal and provincial grants as well as industrial grants and research contracts. A significant part of funding comes from the Natural Sciences and Engineering Research Council (NSERC) which includes Discovery Grants, Alliance Grants, Collaborative Research and Development grants and Industrial Research Chairs. Provincial funding comes from the Fonds de Recherche du Quebec - Nature et Technologies (FRQNT) and other agencies.

CIM has formed research partnerships with numerious companies who support research projects through grants, research contracts and partnerships with federal and provincial agencies. As a result, CIM is able to carry out cutting-edge research that advances scientific knowledge and creates the technologies of the future.

Grant	Total Funding	2021 Amount
NSERC Discovery	$5,865,200	$1,169,325
NSERC CRD	$4,395,431	$1,253,602
NSERC Alliance	$351,471	$145,736
Other NSERC	$2,004,696	$442,196
CFI	$1,206,184	$349,171
Federal	$1,600,265	$919,852
MITACS	$1,290,000	$610,000
FRQNT	$539,106	$200,658
Other Provincial	$1,007,347	$418,675
Industrial Partnerships	$3,808,243	$1,140,538
Other Funding	$2,343,796	$689,861
Total	**$24,411,738**	**$7,339,614**

Infrastructure Funds	Total Funding	2021 Amount
REPARTI	$2,880,000	$158,000
NCRN	$8,727,000	$87,270

2021 Funding Sources



Publications

Angeles, Jorge

C. Li, J. Angeles, H. Guo, D. Tang, R. Liu, Z. Qin, and H. Xiao. “On the Actuation Modes of a Multiloop Mechanism for Space Applications,” IEEE/ASME Transactions on Mechatronics, 2021

C. Li, J. Angeles, H. Guo, H. Yan, D. Tang, R. Liu, and Z. Deng. “Mobility and singularity analyses of a symmetric multi-loop mechanism for space applications,” Proceedings of the Institution of Mechanical Engineers, Part C: Journal of Mechanical Engineering Science, 2021

S. Liu, M. Van, Z. Chen, J. Angeles, and C. Chen. “A novel prosthetic finger design with high load-carrying capacity,” Mechanism and Machine Theory 156, 104121, 2021

X. Shan, J. Angeles, and J.R. Forbes. “Design and Configuration of Folded Platonic Strapdowns of Biaxial MEMS Accelerometers,” Journal of Mechanical Design 143 (2), 2021

J.Angeles, G. Hommer, and P. Kovacs. “Computational Kinematics,” (Dagstuhl Seminar 9341). Schloss Dagstuhl-Leibniz-Zentrum für Informatik, 2021

Arbel, Tal

Q. Tian, T. Arbel, and J. J. Clark. “Task dependent Deep LDA pruning of neural networks,” Journal of Computer Vision and Image Understanding, Volume 203, p. 103154, February 2021.

B. Nichyporuk. J. Cardinell, J. Szeto, R. Mehta, D.L. Arnold, S.Tsaftaris, and T. Arbel. “Cohort Bias Adaptation in Federated Datasets for Lesion Segmentation,” In Proceedings of the 3rd MICCAI Workshop on Domain Adaptation and Representation Transfer (DART) held in conjunction with the 24th International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI 2021), held virtually (Strasbourg, France), September 2021. Lecture Notes in Computer Science, Springer, Vol. 12968, pp. 101-111, 2021. BEST PAPER AWARD

S. Vadacchino, R. Mehta, N. Mohammadi-Sepahvand, B. Nichyporuck, J.J. Clark, and T. Arbel. “HAD-Net: A Hierarchical Adversarial Knowledge Distillation Network for Improved Enhanced Tumour Segmentation Without Post-Contrast Images,” in Proceedings of the 4th Conference on Medical Imaging with Deep Learning (MIDL 2021), held virtually (Lubeck, Germany), July 7-9, 2021. Proceedings of Machine Learning Research (PLMR), pp. 787-801.

X. Bouthillier, P. Delaunay, M. Bronzi, A. Trofimov, B. Nichyporuk, J. Szeto, N. Mohammadi Sepahvand, E. Raff, K. Madan, V. Voleti, S. Ebrahimi Kahou, V. Michalski, T. Arbel, C. Pal, G. Varoquaux, and P. Vincent. “Accounting for Variance in Machine Learning Benchmarks,” in Proceedings of the 4th Conference on Machine Learning and Systems (MLSys 2021), held virtually, April 5-9, 2021.

B. Nichyporuk, J. Szeto, D.L. Arnold, and T. Arbel. “Optimizing Operating Points for High Performance Lesion Detection and Segmentation Using Lesion Size Reweighting,” the 4th Conference on Medical Imaging with Deep Learning (MIDL 2021), held virtually (Lubeck, Germany), July 7-9, 2021. (short paper)

A. Reinke, M. Eisenmann, M. Dietlinde Tizabi, C. H. Sudre, T. RÃ¤dsch, M. Antonelli, T. Arbel, S. Bakas, M. J. Cardoso, V. Cheplygina, K. Farahani, B. Glocker, D. Heckmann-NÃtzel, F. Isensee, P. Jannin, C. E. Kahn, J. Kleesiek, T. Kurc, M. Kozubek, B. A. Landman, G. Litjens, K. Maier-Hein, B. Menze, H. MÃller, J. Petersen, M. Reyes, N. Rieke, B. Stieltjes, R. M. Summers, S. A. Tsaftaris, B. van Ginneken, A. Kopp-Schneider, P. JÃger, and L. Maier-Hein. “Common limitations of performance metrics in biomedical image analysis,” 4th Conference on Medical Imaging with Deep Learning (MIDL 2021), held virtually (Lubeck, Germany), July 7-9, 2021. (short paper - Audience Award for Best Short Oral Presentation)

Boulet, Benoit

X. Huang, D. Wu, M. Jenkin, and B. Boulet. “ModelLight: Model-Based Meta-Reinforcement Learning for Traffic Signal Control,” arXiv preprint arXiv:2111.08067, 2021.

J.E. Zhang, D. Wu, and B. Boulet. “Time Series Anomaly Detection for Smart Grids: A Survey,” 2021 IEEE Electrical Power and Energy Conference (EPEC), 125-130, 2021.

Q. Dang, D. Wu, and B. Boulet. “Electric Vehicle Battery as Energy Storage Unit Consider Renewable Power Uncertainty,” 2021 IEEE Energy Conversion Congress and Exposition (ECCE), 668-673, 2021.

A. Zabetian-Hosseini, G. Joos, and B. Boulet. “Distributed Control Design for V2G in DC Fast Charging Stations,” 2021 IEEE Energy Conversion Congress and Exposition (ECCE), 655-661, 2021.

Y. Fu, D. Wu, and B. Boulet. “Benchmarking Sample Selection Strategies for Batch Reinforcement Learning,” 2021

Q. Dang, D. Wu, and B. Boulet. “EV Fleet as Virtual Battery Resource for Community Microgrid Energy Storage Planning,” IEEE Canadian Journal of Electrical and Computer Engineering 44 (4), 431-442, 2021.

D. Wu, C. Cui, and B. Boulet. “Residential Short-Term Load Forecasting via Meta Learning and Domain Augmentation,” IFIP International Workshop on Artificial Intelligence for Knowledge Management, 2021

W. Lin, D. Wu, and B. Boulet. “Spatial-Temporal Residential Short-Term Load Forecasting via Graph Neural Networks,” IEEE Transactions on Smart Grid 12 (6), 5373-5384. 2021

Q. Dang, D. Wu, and B. Boulet. “EV Fleet Batteries as Distributed Energy Resources Considering Dynamic Electricity Pricing,” 2021 IEEE 12th International Symposium on Power Electronics for Distributed Generation Systems (PEDG), 2021

H. Zhang, S. Seal, D. Wu, B. Boulet, F. Bouffard, and G. Joos. “Data-driven Model Predictive and Reinforcement Learning Based Control for Building Energy Management: a Survey,” arXiv preprint arXiv:2106.14450, 2021

M.A. Beaudoin and B. Boulet. “Fundamental limitations to no-jerk gearshifts of multi-speed transmission architectures in electric vehicles,” Mechanism and Machine Theory 160, 104290, 2021

R. Toukhtarian, M. Darabi, S. Hatzikiriakos, H. Atsbha, and B. Boulet. “Parameter identification of transport PDE/nonlinear ODE cascade model for polymer extrusion with varying die gap,” The Canadian Journal of Chemical Engineering 99 (5), 1158-1176, 2021

Caines, Peter

S. Gao, R. Foguen-Tchuendom and P.E. Caines. “Linear Quadratic Graphon Field Games,” Communications in Information and Systems, Vol 21. No. 3, pp 341 – 369, 2021. DOI: https://dx.doi.org/10.4310/CIS.2021.v21.n3.a2 Preprint arXiv:2006.03964.

P. E. Caines and M.Y. Huang. “Graphon Mean Field Games and Their Equations,” SIAM Journal on Control and Optimization, 2021;59(6):4373-99; arXiv:2008.10216v1 [math.OC]

S. Gao and P.E. Caines. “Subspace Decomposition for Graphon LQR: Applications to VLSNs of Harmonic Oscillators,” IEEE Transactions on Control of Network Systems, vol. 8, no. 2, pp. 576–586, 2021. doi: 10.1109/TCNS.2021.3058923.

R. Foguen Tchuendom, P. E. Caines and M.Y. Huang. “Critical Nodes in Graphon Mean Field Games,” 60th IEEE Conference on Decision and Control, Austin, Texas, 2021, Dec 14, pp. 166-170

S. Gao, P. E. Caines and M.Y. Huang. “LQG Graphon Mean Field Games: Graphon Invariant Subspaces,” 60th IEEE Conference on Decision and Control, Austin, Texas, 2021, Dec 14, pp. 5253-5260

A. Dunyak and P. E. Caines. “Large Scale Systems

and SIR Models: a Featured Graphon Approach," 60th IEEE Conference on Decision and Control, Austin, Texas, 2021 Dec 14, pp. 6928-6933

P. E. Caines, R. Kotiuga, P. Griffith, G. Hermann, et. al. "Memorial for Robert Hermann," Notices of the American Mathematical Society 68(09):1, October 2021. DOI: 10.1090/noti2359,

Clark, James

S. Hasan Mozafari, J. Clark, W. Gross, and B. Meyer. "Implementing Convolutional Neural Networks Using Hartley Stochastic Computing with Adaptive Rate Feature Map Compression," IEEE Open Journal of Circuits and Systems 2, 805-819

A.A. Boatswain Jacques, V.I. Adamchuk, J. Park, G. Cloutier, J.J. Clark, and C. Miller. "Towards a Machine Vision-Based Yield Monitor for the Counting and Quality Mapping of Shallots," Frontiers in Robotics and AI, 8:627067

Q. Tian, T. Arbel, and J.J. Clark. "Task dependent deep LDA pruning of neural network," Computer Vision and Image Understanding, 203, p.103154, January 2021

S. Rangrej and J. J. Clark. "A Probabilistic Hard Attention Model For Sequentially Observed Scenes," 2021 British Machine Vision Conference

S. Hasan Mozafari, J.J. Clark, W. Gross, and B. Meyer. "Hartley Stochastic Computing For Convolutional Neural Networks," 2021 International Workshop on Signal Processing Systems, 1-6

A. Edalati, M. Tahaei, A. Rashid, V. Partovi Nia, J.J. Clark, and M. Rezagholizadeh. "Kronecker Decomposition for GPT Compression," NeurIPS 2021 Efficient Natural Language and Speech Processing Workshop.

S. Vadacchino, J.J. Clark, and T. Arbel. "HAD-Net: A Hierarchical Adversarial Knowledge Distillation Network for Improved Enhanced Tumour Segmentation Without Post-Contrast Images," MIDL 2021 conference.

K. Sayar, N. Muthukrishnan, P. Savadjiev, S. Bhatnagar, J.J. Clark, and R. Forghani. "Medical Image Analysis Using Standard Radiomic Features and Mean Curvature of Isophotes for Prediction of Cervical Lymph Node Metastasis," 2021 SIIM Conference on Machine Intelligence in Medical Imaging.

J.J. Clark. "Active Sensor (Eye) Movement Control," in Computer Vision: A Reference Guide (2021 edition), ed K. Ikeuchi, Springer US, New York, 2021.

A. Edalati, M. Tahaei, A. Rashid, V.P. Nia, J.J. Clark, and M. Rezagholizadeh. "Kronecker Decomposition for GPT Compression," arXiv preprint arXiv:2110.08152. 2021 Oct 15.

A. Chubarau and J.J. Clark. "VTAMIQ: Transformers for Attention Modulated Image Quality Assessment," arXiv preprint arXiv:2110.01655. 2021 Oct 4.

S.B. Rangrej and J.J. Clark. "Visual Attention in Imaginative Agents," arXiv preprint arXiv:2104.00177. 2021 Apr 1.

S. Vadacchino, R.Mehta, N.M. Sepahvand, B. Nichyporuk, J.J. Clark, and T. Arbel. "HAD-Net: A Hierarchical Adversarial Knowledge Distillation Network for Improved Enhanced Tumour Segmentation Without Post-Contrast Images," arXiv e-prints. 2021 Mar:arXiv-2103.

Cooperstock, Jeremy

M.F. de Vargas, D. Marino, A. Weill-Dufos, and J.R. Cooperstock. "Speaking Haptically: from Phonemes to Phrases with a Mobile Haptic Communication System," In: Transactions on Haptics 14.3 (July 2021), pp. 479-490. doi: 10.1109/TOH.2021.3054812. url: https://ieeexplore.ieee.org/document/9337220.

A. Rai, C. Ducher, and J.R. Cooperstock. "Improved Attribute Manipulation in the Latent Space of StyleGAN for Semantic Face Editing," In: International Conference on Machine Learning and Applications. virtually online, Dec. 2021.

D. Marino, M. F. de Vargas, A. Weill-Duflos, and J.R. Cooperstock. "Conversing Using WhatsHap: a Phoneme Based Vibrotactile Messaging Platform," In: World Haptics Conference. Virtual Conference: IEEE, July 2021. doi: 10.1109/WHC49131.2021.9517186. url: https://ieeexplore.ieee.org/document/9517186.

E. Waite, T. Fitz-Gerald, A. Sadaqa, H. Shi, P. Fortin, A. Weill-Duflos, and J.R. Cooperstock. "3D Printed Tactile Illusions and Demonstrations," In: World Haptics Conference, Work in Progress Paper. Virtual Conference: IEEE, July 2021. doi: 10.1109/WHC49131.2021.9517237. url: https://ieeexplore.ieee.org/document/ 9517237.

M. Demers, P. Fortin, A. Weill-Duflos, Y. Yoo, and J.R. Cooperstock. "Active Sampling for E cient Subjective Evaluation of Tactons at Scale," In: World Haptics Conference. Virtual Conference: IEEE, July 2021. doi: 10.1109/WHC49131.2021.9517257. url: https://ieeexplore.ieee.org/document/9517257.

K. E MacLean, V. Levesque, O. Schneider, P. Irani, A. Weill-Duflos, and J.R. Cooperstock. "CanHap 501: Learning Haptic UX Design in Remote Teams," In: World Haptics Conference, Work in Progress Paper. Virtual Conference: IEEE, July 2021. doi: 10.1109/WHC49131.2021.9517152. url: https://ieeexplore.ieee.org/document/9517152.

N.J. A. Pollet, E. Uzan, P.B. Ruivo, T. Abravanel, A. Talhan, Y. Yoo, and J.R. Cooperstock. "Multimodal Haptic Armrest for Immersive 4D Experiences," In: World Haptics Conference, Work in Progress Paper. Virtual Conference: IEEE, July 2021. doi: 10.1109/WHC49131.2021.9517151. url: https://ieeexplore.ieee.org/document/ 9517151.

Y. Li, Y. Yoo, A. Weill-Duflos, and J.R. Cooperstock. "Context-aware Automatic Haptic Effect Generation Algorithm for Improved Content Viewing Experience," In: World Haptics Conference, Work in Progress Paper. Virtual Conference: IEEE, July 2021. doi: 10.1109/WHC49131.2021.9517148. url: https://ieeexplore.ieee.org/document/ 9517148.

Y. Li, Y. Yoo, A. Weill-Duflos, and J.R. Cooperstock. "Towards Context-aware Automatic Haptic Effect Generation for Home Theatre Environments," In: Virtual Reality Software and Technology. Osaka, Japan: ACM, Dec. 2021. Acceptance rate 26%.

Y. Yoo, J. Regimbal, and J.R. Cooperstock. "Identification and Information Transfer of Multidimensional Tactons Presented by a Single Vibrotactile Actuator," In: World Haptics Conference. Virtual Conference: IEEE, July 2021. doi: 10.1109/WHC49131.2021.9517169. url: https://ieeexplore.ieee.org/document/9517169.

P. Fortin, J. Blum, A. Weill-Duflos, and J.R. Cooperstock. "System and Method for Wearable Device Contact Force Estimation and Adjustment Feedback," provisional patent application US 05001770-936USPR, Oct. 25, 2021

P. Fortin, S. Kim, and J.R. Cooperstock. "Closed-loop XR Stimulus Presentation and Perception Feedback using Multi-Channel Physiological Signals," US patent application US 2020P00157WO, July 12, 2021

Dudek, Gregory

F. Hogan, M. Jenkin, G.L. Dudek, Y. Girdhar, S. Rezaei-Shoshtari, and D. Meger. "Semitransparent tactile surface sensor and a method of sensing an interaction with an object using the semitransparent tactile surface sensor," US Patent App. 17/139,642, 2021.

S. Wapnick, T. Manderson, D. Meger, and G. Dudek. "Trajectory-Constrained Deep Latent Visual Attention for Improved Local Planning in Presence of Heterogeneous Terrain," 2021 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2021.

X. Chen, J. Wang, H. Li, Y.T. Xu, D. Wu, X. Liu, G. Dudek, T. Lee, and I. Park. "One for All: Traffic Prediction at Heterogeneous 5G Edge with Data-Efficient Transfer Learning," 2021 IEEE Global Communications Conference (GLOBECOM), 01-06, 2021

D. Wu, J. Kang, Y.T. Xu, H. Li, J. Li, X. Chen, D. Rivkin, M. Jenkin, T. Lee, I. Park, X. Liu, and G. Dudek. "Load Balancing for Communication Networks via Data-Efficient Deep Reinforcement Learning," 2021 IEEE Global Communications Conference (GLOBECOM), 01-07, 2021.

C. Hu, X. Chen, J. Wang, H. Li, J. Kang, Y.T. Xu, X. Liu, D. Wu, S. Jang, I. Park, and G. Dudek. "AFB: Improving Communication Load Forecasting Accuracy with Adaptive Feature Boosting," 2021 IEEE Global Communications Conference (GLOBECOM), 01-06, 2021.

D. Rivkin, D. Meger, D. Wu, X. Chen, X. Liu, G. Dudek. "Learning Assisted Identification of Scenarios Where Network Optimization Algorithms Under-Perform," 2021 IEEE Global Communications Conference (GLOBECOM), 1-7, 2021.

J. Hansen, K. Virji, T. Manderson, D. Meger, and G. Dudek. "DRIFT-NCRN: A Benchmark Dataset for Drifter Trajectory Prediction," 2021.

M. Rezanejad, B. Samari, E. Karimi, I. Rekleitis, G. Dudek, and K. Siddiqi. "Average Outward Flux Skeletons for Environment Mapping and Topology Matching," arXiv preprint arXiv:2111.13826, 2021.

M.J. Roshtkhari, J.C.G. Higuera, and G.L. Dudek. "Systems and methods for automated camera calibration," US Patent 11,176,706, 12, 2021.

Y. Huang, Y. Yao, J. Hansen, J. Mallette, S. Manjanna, G. Dudek, and D. Meger. "An Autonomous Probing

System for Collecting Measurements at Depth from Small Surface Vehicles," arXiv preprint arXiv:2110.14738, 2021.

D. Wu, T. Li, D. Meger, M. Jenkin, X. Liu, and G. Dudek. "Multi-batch Reinforcement Learning via Sample Transfer and Imitation Learning," 2021.

J. Kang, X. Chen, J. Wang, C. Hu, X. Liu, and G. Dudek, "MOBA: Multi-teacher Model Based Reinforcement Learning," 2021.

B.H. Baghi and G. Dudek. "Sample Efficient Social Navigation Using Inverse Reinforcement Learning," arXiv preprint arXiv:2106.10318, 1, 2021

F. Shkurti, G. Dudek, Y. Abeysirigoonawardena, E.A. Abolfathi, and J. Luo. "Iterative generation of adversarial scenarios," US Patent 11,036,232, 2021.

J. Kang, X. Chen, D. Wu, Y.T. Xu, X. Liu, G. Dudek, T. Lee, and I. Park. "Hierarchical Policy Learning for Hybrid Communication Load Balancing," ICC 2021-IEEE International Conference on Communications, 1-6, 2, 2021

J. Wang, X. Chen, X. Liu, and G. Dudek. "UWB-Assisted Fast mmWave Beam Alignment," ICC 2021-IEEE International Conference on Communications, 1-6, 2021

Y. Girdhar, D. Rivkin, D. Wu, M. Jenkin, X. Liu, and G. Dudek. "Optimizing Cellular Networks via Continuously Moving Base Stations on Road Networks," 2021 IEEE International Conference on Robotics and Automation (ICRA), 4020-4025, 2021

J.F. Tremblay, T. Manderson, A. Noca, G. Dudek, and D. Meger. "Multimodal dynamics modeling for off-road autonomous vehicles," 2021 IEEE International Conference on Robotics and Automation (ICRA), 1796-1802, 1, 2021.

S. Manjanna, M.A. Hsieh, and G. Dudek. "Scalable Multi-Robot System for Non-myopic Spatial Sampling," arXiv preprint arXiv:2105.10018, 2021.

S. Rezaei-Shoshtari, F.R. Hogan, M. Jenkin, D. Meger, and G. Dudek. "Learning Intuitive Physics with Multimodal Generative Models," Proceedings of the AAAI Conference on Artificial Intelligence 35 (7), 6110-6118, 1, 2021.

X. Chen, H. Li, Z. Chenyi, X. Liu, D. Wu, and G.L. Dudek. "System and method for wifi-based indoor localization via unsupervised domain adaptation," US Patent App. 16/913,493, 1, 2021.

A. Holliday and G. Dudek. "Scale-invariant localization using quasi-semantic object landmarks," Autonomous Robots 45 (3), 407-420, 2021.

A. Konar, B.H. Baghi, and G. Dudek. "Learning goal conditioned socially compliant navigation from demonstration using risk-based features," IEEE Robotics and Automation Letters 6 (2), 651-658, 5, 2021.

F.R. Hogan, M. Jenkin, S. Rezaei-Shoshtari, Y. Girdhar, D. Meger, and G. Dudek. "Seeing through your skin: Recognizing objects with a novel visuotactile sensor," Proceedings of the IEEE/CVF Winter Conference on Applications of Computer Vision, 5, 2021.

Forbes, James Richard

D. Lisus, C.C. Cossette, M. Shalaby, and J.R. Forbes. "Heading Estimation Using Ultra-wideband Received Signal Strength and Gaussian Processes," IEEE Robotics and Automation Letters, vol. 6, no. 4, pp. 8387–8393, 2021. Jointly accepted to IROS.

M. Shalaby, C.C. Cossette, J.L. Ny, and J.R. Forbes. "Cascaded Filtering Using the Sigma Point Transformation," IEEE Robotics and Automation Letters, vol. 6, no. 3, pp. 4758–4765, 2021. Jointly accepted to ICRA. Best student paper award finalist (1 of 4 finalists).

M. Shalaby, C.C. Cossette, J.R. Forbes, and J.L. Ny. "Relative Position Estimation in Multi-Agent Systems Using Attitude-Coupled Range Measurements," IEEE Robotics and Automation Letters, vol. 6, no. 3, pp. 4955–4961, 2021. Jointly accepted to ICRA.

C.C. Cossette, M. Shalaby, D. Saussie, J.R. Forbes, and J.L. Ny. "Relative Position Estimation Between Two UWB Devices with IMUs," IEEE Robotics and Automation Letters, vol. 6, no. 3, pp. 4313–4320, 2021. Jointly accepted to ICRA.

M.-A. Lavoie and J.R. Forbes. "Map-Aided Train Navigation with IMU Measurements," Conference on Intelligent Robots and Systems, Prague, Czech Republic (online), September 27 - October 1, 2021.

C.C. Cossette, M. Shalaby, D. Saussie, and J.R. Forbes. "Localization with Directional Coordinates," Conference on Intelligent Robots and Systems, Prague, Czech Republic (online), September 27 - October 1, 2021.

N. Pavlasek, A. Walsh, and J.R. Forbes. "Invariant Extended Kalman Filtering Using Two Position Receivers for Extended Pose Estimation," International Conference on Robotics and Automation, Xi'an, China, May 30 - June 5, 2021.

P. Laferriere, S. Laferriere, S. Dahdah, J.R. Forbes, and L. Paull. "Deep Koopman Representation for Control over Images (DKRCI)," 18th Conference on Robots and Vision, Burnaby, BC, May 26 - 28, 2021.

J.R. Forbes, F. Ahmed, and M. Cohen. "Invariant Model Predictive Control of Quadrotor Vehicles," Robotics: Science and Systems, Online, July 12-16, 2021. Presented in "Software Tools for Real-Time Optimal Control" workshop.

P. Decoste and J.R. Forbes. "Robot Navigation in Unknown Environments: Towards Topographical SLAM," 2021 McGill Summer Undergraduate Research in Engineering (SURE) Poster Presentation, Montreal, QC, August 17, 2021.

J. Yun and J.R. Forbes. "Standardized Datasets for GNC Algorithm Development," 2021 McGill Summer Undergraduate Research in Engineering (SURE) Poster Presentation, Montreal, QC, August 17, 2021.

S. Li and J.R. Forbes. "Dataset Collection for Benchmarking Robot Navigation Methods," 2021 McGill Summer Undergraduate Research in Engineering (SURE) Poster Presentation, Montreal, QC, August 17, 2021.

Kövecses, Jozsef

A. Peiret, E. Karpman, L. Kovacs, J. Kövecses, D, Holz, and M. Teichmann. "Modelling of Offroad Wheeled Vehicles for Real-time Dynamic Simulation," Journal of Terramechanics, Vol. 97, pp.45-58, 2021.

A. Raoofian, A. Peiret, J. Kövecses, and M. Teichmann. "Model-based Co-simulation of Non-smooth Mechanical Systems," ECCOMAS Thematic Conference on Multibody Dynamics, December 12 - 15, 2021.

L. Kerr and J. Kövecses. "Reduced Order Interface Modelling for Haptic Simulation and Interfacing," ECCOMAS Thematic Conference on Multibody Dynamics, December 12 - 15, 2021.

S. Arbatani, J. Kövecses, and M. Teichmann. "Reinforcement Learning Assisted Robotic Contact Tasks," ECCOMAS Thematic Conference on Multibody Dynamics, December 12 - 15, 2021.

E. Karpman, D. Holz, J. Kövecses, P. Niksirat, and K. Skonieczny. "A Position-Based Discrete Element Method for Wheel-Soil Modelling," 20th International Conference of the International Society of Terrain-Vehicle Systems, Sep. 27-29, 2021.

A. Peiret, A. Raoofian, F. Gonzalez, J. Kövecses, and M. Teichmann. "Model-Based Interfacing in Co-Simulation," COSIM 2021 - International Symposium on Co-Simulation and Solver Coupling in Dynamics, May 23 – 26, 2021.

Kry, Paul

Y. Luo, K. Xie, S. Andrews, and P. Kry. "Catching and Throwing Control of a Physically Simulated Hand," In Motion, Interaction and Games (MIG '21). Article 15, 1–7, 2021. DOI:https://doi.org/10.1145/3487983.34883002

S. Andrews, L. Nassif, K. Erleben, and P.G. Kry. "Coupling Friction with Visual Appearance," Proc. ACM Comput. Graph. Interact. Tech.4, 3, Article 31 (September 2021), 20 pages, 2021. DOI:https://doi.org/10.1145/34801383

P. Schreiner, M. Perepichka, H. Lewis, S. Darkner, P.G. Kry, K. Erleben, and V.B. Zordan. "Global Position Prediction for Interactive Motion Capture," Proc. ACM Comput. Graph. Interact. Tech.4, 3, Article 39 (September 2021), 2021. 16pages.DOI:https://doi.org/10.1145/3479985

Langer, Michael

M.S. Langer. "Interreflections," Invited Book chapter in Computer Vision: A Reference Guide. (Ed. K. Ikeuchi), Springer 2021. https://doi.org/10.1007/978-3-030-63416-2_524

X. Morin-Duchesne and M.S. Langer. "Simulated LiDAR Repositioning: a novel point cloud data augmentation method," arXiv:2111.10650 arXiv cs.CV

Levine, Martin

A. Chan, M.D. Levine, and M. Javan. "Player identification in hockey broadcast videos," Expert Systems with Applications 165, 113891, 2021.

M. Levine and Z.M. Lohinai. "Resolving the Contradictory Functions of Lysine Decarboxylase and Butyrate in Periodontal and Intestinal Diseases," Journal of Clinical Medicine 10 (11), 2360, 2021.

M. Levine, L.M. Collins, and Z. Lohinai. “Zinc chloride inhibits lysine decarboxylase production from Eikenella corrodens in vitro and its therapeutic implications,” Journal of Dentistry 104, 103533, 2021.

Lin, Hsiu-Chin

O. Cebe, C. Tiseo, G. Xin, H.-C. Lin, J. Smith, and M. Mistry. “Online dynamic trajectory optimization and control for a quadruped robot,” In 2021 IEEE International Conference on Robotics and Automation (ICRA), pp. 12773-12779. IEEE, 2021.

Mahajan, Aditya

M. Afshari and A. Mahajan. “Multi-agent estimation and filtering for minimizing team mean-squared error,” IEEE Transactions on Signal Processing, vol. 69, pp. 5206–5221, Aug 2021.

A. Jitani, A. Mahajan, Z. Zhu, H. Abou-zeid, E.T. Fapi, and H. Purmehdi. “Structure-aware reinforcement learning for node overload protection in mobile edge computing,” IEEE International Conference on Communications, Montreal, Canada, June 2021.

K. Kaza, A. Mahajan, and J. Le Ny. “Decision referrals in human-automation teams,” IEEE Conference on Decision and Control, Austin, TX, Dec 2021.

R. Seraj, A. Mahajan, and J. Le Ny. “Mean-field approximation for large-population beauty-contest games,” IEEE Conference on Decision and Control, Austin, TX, Dec 2021.

M. Gagrani, S. Sudhakara, A. Mahajan, A. Nayyar, and Y. Ouyang. “Thompson sampling for linear quadratic mean-field teams,” IEEE Conference on Decision and Control, Austin, TX, Dec 2021. (invited talk)

J. Subramanian, A. Sinha, and A. Mahajan. “Robustness of Markov perfect equilibrium to model approximations in general-sum dynamic games,” IEEE Indian Control Conference, Mumbai, India, Dec 2021. (invited talk)

N. Akbarzadeh and A. Mahajan. “Maintenance of a collection of machines under partial observability: Indexability and computation of Whittle index,” Les Cahiers du GERAD, no. G-2021-26, April 2021.

Meger, David

E. Smith, D. Meger, L. Pineda, R. Calandra, J. Malik, A. Romero Soriano, and M. Drozdzal. “Active 3d shape reconstruction from vision and touch,” In Proceedings of the Conference on Advances in Neural Information Processing Systems (NeurIPS), volume 34, 2021.

S. Fujimoto, D. Meger, and D. Precup. “A deep reinforcement learning approach to marginalized importance sampling with the successor representation,” In Proceedings of the International Conference on Machine Learning (ICML), 2021.

J.-F. Tremblay, T. Manderson, A. Noca, G. Dudek, and D. Meger. “Multimodal dynamics modeling for off-road autonomous vehicles,” In Procedings of the IEEE International Conference on Robotics and Automation (ICRA), 2021.

S. Rezaei-Shoshtari, F. Hogan, M. Jenkin, D. Meger, and G. Dudek. “Learning intuitive physics with multimodal generative models,” In Proceedings of the AAAI Conference on Artificial Intelligence (AAAI-21), 2021.

F. Hogan, M. Jenkin, S. Razaei-Shoshtari, Y. Girdhar, D. Meger, and G. Dudek. “Seeing through your skin: Recognizing objects with a novel visuotactile sensor,” In Proceedings of the Workshop on Applications of Computer Vision (WACV), 2021.

R. Cheng, C.G. Agia, F. Shkurti, D. Meger, and G. Dudek. “Latent attention augmentation for robust autonomous driving policies,” In Proceedings of the IEEE/RSJ International Conference on Robotics and Intelligent Systems (IROS), 2021.

S. Wapnick, T. Manderson, D. Meger, and G. Dudek. “Trajectory-constrained deep latent visual attention for improved local planning in presence of heterogeneous terrain,” In Proceedings of the IEEE/RSJ International Conference on Robotics and Intelligent Systems (IROS), 2021.

D. Rivkin, D. Meger, D. Wu, X. Chen, X. Liu, and G. Dudek. “Learning assisted identification of scenarios where network optimization algorithms under-perform,” In Proceedings of the IEEE Global Communications Conference (GLOBECOM), 2021.

H. Wang and D. Meger. “Robotic object manipulation with full-trajectory gan-based imitation learning,” In Proceedings of the Conference on Robotics and Vision (CRV), 2021.

Y. Huang, Y. Yao, J. Hansen, J. Mallette, S. Manjanna, G. Dudek, and D. Meger. “An Autonomous Probing System for Collecting Measurements at Depth from Small Surface Vehicles,” In IEEE Oceans Conference and Exposition, 2021.

Misra, Arun

M. Chehreghani, A.R. Abdelbaki, A.K. Misra, and M.P. Païdoussis. “Experiments on the dynamics of a cantilevered pipe conveying fluid and subjected to reverse annular flow,” Journal of Sound and Vibration 515, 116480, 2021.

M.P. Païdoussis, A.R. Abdelbaki, M.F.J. Butt, M. Tavallaeinejad, K. Moditis, A.K. Misra, M. Nahon, and J.L. Ratigan. “Dynamics of a cantilevered pipe subjected to internal and reverse external axial flow: A review,” Journal of Fluids and Structures 106, 103349, 2021.

I. Jean, A.K. Misra, and A. Ng. “Controlled Spacecraft Trajectories in the Context of a Mission to a Binary Asteroid System,” The Journal of the Astronautical Sciences 68 (1), 38-70, 2021.

L.O. Marchi, D.M. Sanchez, F.C.F. Venditti, A.F. Prado, and A.K. Misra. “On the effects of solar radiation pressure on the deviation of asteroids,” Revista mexicana de astronomía y astrofísica 57 (2), 279-295, 2021.

A.K. Misra and S. Cohen. “Space Elevator—A Revolutionary Space Transportation System,” Mechanical Sciences, 105-120, 2021.

Moon, AJung

C. Lin and A. Moon. “Can Open Source Licenses Help Regulate Lethal Autonomous Weapons?,” IEEE Technology and Society Magazine, 40(3), 25-27, October 2021. Retrieved from doi:10.1109/MTS.2021.3101832

A. Moon, M. Hashmi, H.F.M. Van der Loos, E. Croft, and A. Billard. “Design of Hesitation Gestures for Nonverbal Human-Robot Negotiation of Conflicts,” Transactions on Human-Robot Interaction, 2021. Retrieved from doi:10.1145/3418302

A. Moon, S. Rismani, and H.F. Van der Loos. “Ethics of Corporeal, Co-present Robots as Agents of Influence: a Review,” Springer Current Robotics Report, 2021. https://doi.org/10.1007/s43154-021-00053-6

S. Rismani and A. Moon. “How do AI systems fail socially?: Social Failure Mode and Effect Analysis for AI,” In IEEE International Symposium on Technology and Society 2021 Canada: IEEE, July 2021.

K. Szilagyi, J. Millar, A. Moon, and S. Rismani. “Driving Into the Loop: Mapping Automation Bias & Liability Issues for Advanced Driver Assistance Systems,” In We Robot 2021, October 2021.

C. Lin, J. Rhim, and A. Moon. “Mobile Robotic Telepresence: A New Social Hierarchy?,” In 30th IEEE International Conference on Robot and Human Interactive Communication - Robot Behavior Adaptation to Human Social Norms (TSAR) Workshop IEEE, August 2021.

S. Rismani and A. Moon. “How do AI systems fail socially? Social Failure Mode and Effect Analysis (FMEA) for artificial intelligence systems,” In We Robot 2021, July 2021.

J. Rhim, C. Lin, and A. Moon. “The R2D2 (Roboethics to Design & Development) Competition: Translating moral values into practice,” In We Robot 2021, October 2021.

Nahon, Meyer

J.-C. Hernandez Ramirez and M. Nahon. “A Gravity-Referenced Moving Frame for Vehicle Path Following Applications in 3D,” Robotics and Automation Letters, Vol. 6, No. 3, pp. 4393-4400, 2021. Presented at ICRA 2021.

F. Butt, M. P. Paidoussis and M. Nahon. “Dynamics of a Confined Pipe Aspirating Fluid and Concurrently Subjected to External Axial Flow: an Experimental Investigation,” Journal of Fluids and Structures, Vol. 104, July 2021.

F. Butt, M. P. Paidoussis and M. Nahon. “Dynamics of a Confined Pipe Aspirating Fluid and Concurrently Subjected to External Axial Flow: a Theoretical Investigation,” Journal of Sound and Vibration, Vol. 509, Sept. 2021.

M. Paidoussis, A. Abdelbaki, M. Butt, M. Tavallaeinejad, K. Moditis, A. Misra, M. Nahon and J. Ratigan. “Dynamics of a Cantilevered Pipe Subjected to Internal and External Axial Flow: A Review,” Journal

of Fluids and Structures, Vol. 106, Oct. 2021.

E. Bulka and M. Nahon. “A Unified Controller for Unmanned Aerial Vehicles,” Autonomous Robots, Vol. 45, pp. 859-883, 2021.

J. Hernandez Ramirez and M. Nahon. “A Gravity-Referenced Moving Frame for Vehicle Path Following Applications in 3D,” International Conference on Robotics and Automation (ICRA2021), Xi’an, China, May 30-June 5, 2021.

F. El Tin, C. Patience, A. Borowczyk, M. Nahon and I. Sharf. “Exploitation of Thermals in Powered and Unpowered Flight of Autonomous Gliders,” International Conference on Unmanned Aircraft Systems (ICUAS’21), Athens, Greece, June 15-18, 2021.

J. Hernandez Ramirez and M. Nahon. “Pilot-Assist Landing System for Hover Capable Unmanned Fixed-Wing Aerial Vehicles in All Flight Regimes,” International Conference on Unmanned Aircraft Systems (ICUAS’21), Athens, Greece, June 15-18, 2021.

Nowrouzezahrai, Derek

E. Tseng, A. Mosleh, F. Mannan, K.S. Arnaud, A. Sharma, Y. Peng, A. Braun, D. Nowrouzezahrai, J. Lalonde, and F. Heide. “Differentiable Compound Optics and Processing Pipeline Optimization for End-to-end Camera Design,” ACM Trans. Graph., 40(2): 18:1-18:19. 2021.

T. Takikawa, J. Litalien, K. Yin, K. Kreis, C. Loop, D. Nowrouzezahrai, A. Jacobson, M. McGuire, and S. Fidler. “Neural Geometric Level of Detail: Real-Time Rendering With Implicit 3D Shapes,” In IEEE Conference on Computer Vision and Pattern Recognition, CVPR 2021, virtual, June 19-25, 2021, pages 11358–11367, 2021. Computer Vision Foundation / IEEE

I.H. Laradji, P. Rodríguez, D. Vázquez, and D. Nowrouzezahrai. “SSR: Semi-supervised Soft Rasterizer for single-view 2D to 3D Reconstruction,” In IEEE/CVF International Conference on Computer Vision Workshops, ICCVW 2021, Montreal, BC, Canada, October 11-17, 2021, pages 1427–1436, 2021. IEEE

W. Jeon, C. Su, P. Barde, T. Doan, D. Nowrouzezahrai, and J. Pineau. “Regularized Inverse Reinforcement Learning,” In 9th International Conference on Learning Representations, ICLR 2021, Virtual Event, Austria, May 3-7, 2021, 2021. OpenReview.net

J.K. Murthy, M. Macklin, F. Golemo, V. Voleti, L. Petrini, M. Weiss, B. Considine, J. Parent-Lévesque, K. Xie, K, Erleben, L. Paull, F. Shkurti, D. Nowrouzezahrai, and S. Fidler. “gradSim: Differentiable simulation for system identification and visuomotor control,” In 9th International Conference on Learning Representations, ICLR 2021, Virtual Event, Austria, May 3-7, 2021, 2021. OpenReview.net

K. Villeneuve, A. Gruson, I. Georgiev, and D. Nowrouzezahrai, In A. Bousseau, and M. McGuire, editor(s), “Practical Product Sampling for Single Scattering in Media,” 32nd Eurographics Symposium on Rendering, EGSR 2021 - Digital Library Only Track, Saarbrücken, Germany, June 29 - July 2, 2021, pages 55–60, 2021. Eurographics Association

Z. Majercik, T. Müller, A. Keller, D. Nowrouzezahrai, and M. McGuire. “Dynamic Diffuse Global Illumination Resampling,” In SIGGRAPH 2021: Special Interest Group on Computer Graphics and Interactive Techniques Conference, Talks, Virtual Event, USA, August 9-13, 2021, pages 24:1–24:2, 2021. ACM

I.H. Laradji, P. Rodríguez, O. Mañas, K. Lensink, M. Law, L. Kurzman, W. Parker, D. Vázquez, and D. Nowrouzezahrai. “A Weakly Supervised Consistency-based Learning Method for COVID-19 Segmentation in CT Images,” In IEEE Winter Conference on Applications of Computer Vision, WACV 2021, Waikoloa, HI, USA, January 3-8, 2021, pages 2452–2461, 2021. IEEE

P. Barde, T. Karch, D. Nowrouzezahrai, C. Moulin-Frier, C.J. Pal, and P. Oudeyer. “Learning to Guide and to be Guided in the Architect-Builder Problem,” In 10th International Conference on Learning Representations, ICLR 2022, Virtual Event, 2022. OpenReview.net

T. Takikawa, J. Litalien, K. Yin, K. Kreis, C. Loop, D. Nowrouzezahrai, A. Jacobson, M. McGuire, and S. Fidler. “Neural Geometric Level of Detail: Real-time Rendering with Implicit 3D Shapes,” CoRR, abs/2101.10994. 2021.

F.G. Harvey, M. Yurick, D. Nowrouzezahrai, and C.J. Pal. “Robust Motion In-betweening,” CoRR, abs/2102.04942. 2021.

T. Kim, H.E. Rushmeier, J. Dorsey, D. Nowrouzezahrai, R. Syed, W. Jarosz, and A.M. Darke. “Countering Racial Bias in Computer Graphics Research,” CoRR, abs/2103.15163. 2021.

K.M. Jatavallabhula, M. Macklin, F. Golemo, V. Voleti, L. Petrini, M. Weiss, B. Considine, J. Parent-Lévesque, K. Xie, K. Erleben, L. Paull, F. Shkurti, D. Nowrouzezahrai, and S. Fidler. “gradSim: Differentiable simulation for system identification and visuomotor control,” CoRR, abs/2104.02646. 2021.

Z. Majercik, T. Müller, A. Keller, D. Nowrouzezahrai, and M. McGuire. “Dynamic Diffuse Global Illumination Resampling,” CoRR, abs/2108.05263. 2021.

I.H. Laradji, P. Rodríguez, D. Vázquez, and D. Nowrouzezahrai. “SSR: Semi-supervised Soft Rasterizer for single-view 2D to 3D Reconstruction,” CoRR, abs/2108.09593. 2021.

P. Barde, T. Karch, D. Nowrouzezahrai, C. Moulin-Frier, C.J. Pal, and P. Oudeyer. “Learning to Guide and to Be Guided in the Architect-Builder Problem,” CoRR, abs/2112.07342. 2021.

Pineau, Joelle

J. Pineau, P. Vincent-Lamarre, K. Sinha, V. Larivière, A. Beygelzimer, F. D’Alche-Buc, E. Fox, and H. Larochelle. “Improving reproducibility in machine learning research: a report from the NeurIPS 2019 reproducibility program,” Journal of Machine Learning Research 22. 2021.p.1-20

E. Kochmar, D.D. Vu, R. Belfer, V. Gupta, I.V. Serban, and J. Pineau. “Automated Data-Driven Generation of Personalized Pedagogical Interventions in Intelligent Tutoring Systems,” International Journal of Artificial Intelligence in Education, 2021, 1-27

H. Satija, P.S. Thomas, J. Pineau, and R. Laroche. “Multi-Objective SPIBB: Seldonian Offline Policy Improvement with Safety Constraints in Finite MDPs,” Advances in Neural Information Processing Systems (NeurIPS) 2021

J. Lee, W. Jeon, B. Lee, J. Pineau, and K.E. Kim. “Optidice: Offline policy optimization via stationary distribution correction estimation,” International Conference on Machine Learning (ICML), 2021, 6120-6130

S. Sodhani, A. Zhang, and J. Pineau. “Multi-task reinforcement learning with context-based representations,” International Conference on Machine Learning (ICML), 2021, 9767-9779

K. Sinha, P. Parthasarathi, J. Pineau, and A. Williams. “Unnatural language inference,” Annual Meeting of the Association for Computational Linguistics (ACL). 2021. Outstanding Paper Award.

P. Parthasarathi, J. Pineau, and S. Chandar. “Do Encoder Representations of Generative Dialogue Models have sufficient summary of the Information about the task?,” Special Interest Group on Discourse and Dialogue (SigDial). 2021.

P. Parthasarathi, M. Abdelsalam, J. Pineau, and S. Chandar. “A Brief Study on the Effects of Training Generative Dialogue Models with a Semantic loss,” Special Interest Group on Discourse and Dialogue (SigDial). 2021

J. Romoff, P. Henderson, D. Kanaa, E. Bengio, A. Touati, P.L. Bacon, and J. Pineau. “TDprop: Does Adaptive Optimization With Jacobi Preconditioning Help Temporal Difference Learning?,” International Conference on Autonomous Agents and MultiAgent Systems (AAMAS). 2021

P. Parthasarathi, K. Sinha, J. Pineau, and A. Williams. “Sometimes we want ungrammatical translations,” Conference on Empirical Methods in Natural Language Processing (EMNLP). 2021

K. Sinha, R. Jia, D. Hupkes, J. Pineau, A. Williams, and D. Kiela. “Order word matters pre-training for little,” Conference on Empirical Methods in Natural Language Processing (EMNLP). 2021

D. Jambor, K. Teru, J. Pineau, and W.L. Hamilton. “Exploring the Limits of Few-Shot Link Prediction in Knowledge Graphs,” European Chapter of the Association for Computational Linguistics (EACL). 2021.

S. Delacroix, J. Pineau, and J. Montgomery. “Democratising the digital revolution: the role of data governance,” Book chapter in Reflections on AI for Humanity, Braunschweig & Ghallab (eds.), Springer, 2021. 40-52. Accepted, to appear in 2022

M. Cousineau, V. Verter, S.A. Murphy, and J. Pineau. “Estimating Causal Effects with Optimization-Based Methods: A Review and Empirical Comparison,” European Journal of Operational Research 2022.

L. Caccia, R. Aljundi, N. Asadi, T. Tuytelaars, J. Pineau, and E. Belilovsky. “New Insights on Reducing Abrupt Representation Change in Online Continual Learning,” International Conference on Learning Representations 2022

A. GX-Chen, V. Chelu, B.A. Richards, and J. Pineau. “A Generalized Bootstrap Target for Value-Learning, Efficiently Combining Value and Feature Predictions,” American Associate for Artificial

Intelligence (AAAI) 2021.

L. Caccia, R. Aljundi, N. Asadi, T. Tuytelaars, J. Pineau, and E. Belilovsky. “Reducing representation drift in online continual learning,” arXiv preprint arXiv:2104.05025

K. Bullard, D. Kiela, F. Meier, J. Pineau, and J. Foerster. “Quasi-equivalence discovery for zero-shot emergent communication,” arXiv preprint arXiv:2103.08067

C. Lyle, A. Zhang, M. Jiang, J. Pineau, and Y. Gal. “Resolving Causal Confusion in Reinforcement Learning via Robust Exploration,” Self-Supervision for Reinforcement Learning Workshop-ICLR 2021

M. Tomar, A. Zhang, R. Calandra, M.E. Taylor, and J. Pineau. “Model-invariant state abstractions for model-based reinforcement learning,” arXiv preprint arXiv:2102.09850

B. Li, V. François-Lavet, T. Doan, and J. Pineau. “Domain adversarial reinforcement learning,” arXiv preprint arXiv:2102.07097

A. Sriram, M. Muckley, K. Sinha, F. Shamout, J. Pineau, K.J. Geras, L. Azour, Y. Aphinyanaphongs, N. Yakubova, and W. Moore. “Covid-19 prognosis via self-supervised representation learning and multi-image prediction,” arXiv preprint arXiv:2101.04909

C.Y. Su, S. Zhou, E. Gonzalez-Kozlova, G. Butler-Laporte, (...) J. Pineau (...) and B. Richards. “Circulating proteins to predict adverse COVID-19 outcomes,” medRxiv. https://doi.org/10.1101/2021.10.04.21264015

Sedal, Audrey

A. Sedal, J. Bishop-Moser, S. Kota, M. Fisher, M. Kohler, and A. Wineman. “Fluidic Actuator System Using Auxetic Beam Reinforcements,” US Patent App. 17/007,482, 2021

A. Sedal, N.R. Corson, J.A.B. Flores, K. Healy, A.H. Memar, and A. Doxon. “Artificial reality devices, including haptic devices and coupling sensors,” US Patent App. 17/019,057, 2021

Sharf, Inna

M.K. Jorgensen and I. Sharf. “Effect of Release Conditions on Casualty Risk Factor in Uncontrolled Re-entry of Large Space Debris,” Advances in Space Research, Vol. 68, pp. 25-42, 2021.

Y. Hu, I. Sharf, and L. Chen. “Distributed Orbit Determination and Observability Analysis for Satellite Constellations with Angles-Only Measurements,” Automatica, Vol. 129, 2021.

C. Masse, I. Sharf, and F. Deleflie. “SRP-J2 resonances in low Earth orbits for objects with a time-variant area-to-mass ratio,” Proceedings of the 31st AAS/AIAA Space Flight Mechanics Meeting, AAS 21-375, virtual, January 2021.

A. Safaei and I. Sharf, “Velocity estimation for UAVs using ultra wide-band system,” 2021 International Conference on Unmanned Aircraft Systems, ICUAS 2021, pp. 202–209, virtual, 2021.

F. El Tin, C. Patience, A. Borowczyk, M. Nahon, and I. Sharf, “Exploitation of Thermals in Powered and Unpowered Flight of Autonomous Gliders,” 2021 International Conference on Unmanned Aircraft Systems, ICUAS 2021, pp. 1089–1095, virtual, 2021.

A. Maalouly, I. Sharf, and I. Mantegh. “Geometrically Based Collision Avoidance for Quadrotors under Short Sensing Distance Conditions,” 2021 International Conference on Unmanned Aircraft Systems, ICUAS 2021, pp. 1096–1105, virtual, 2021.

A. Safaei and I. Sharf. “Adaptive model-free formation-tracking controller and observer for collaborative payload transport by four drones,” 2021 IEEE International Symposium on Safety, Security, and Rescue Robotics (SSRR), pp. 55-62, New York City, October 25-27, 2021.

C. Masse, I. Sharf, and F. Deleflie. “Exploitation of SRP-J2-phi Resonances for De-orbitation of Space Objects with Time-Variant Area-to-Mass Ratio,” Proceedings of the 72th International Astronautical Congress, IAC–21–C1.7.6, Dubai, October 23-26, 2021.

Siddiqi, Kaleem

Y. Xu, Y. Wang, S. Tsogkas, J. Wan, X. Bai, S. Dickinson, and K. Siddiqi. “Deepflux for skeleton detection in the wild,” International Journal of Computer Vision 129 (4), 1323-1339, 2021.

P. Khandelwal, D.L. Collins, and K. Siddiqi. “Spine and Individual Vertebrae Segmentation in Computed Tomography Images Using Geometric Flows and Shape Priors,” Frontiers in Computer Science, July 2021.

P. Bohleber, M. Roman, C. Barbante, S. Vascon, K. Siddiqi, and M. Pelillo. “Ice Core Science Meets Computer Vision: Challenges and Perspectives,” Frontiers in Computer Science, June 2021.

P. Savadjiev, B. Gallix, M. Rezanejad, S. Bhatnagar, A. Semionov, K. Siddiqi, R. Forghazi, C. Reinhold, D.H. Eidelman, and R.J. Dandurand. “Improved Detection of Chronic Obstructive Pulmonary Disease at Chest CT Using the Mean Curvature of Isophotes,” Radiology: Artificial Intelligence, e210105, December 2021.

A.K. Mondal, V. Jain, and K. Siddiqi. “Mini-batch graphs for robust image classification,” British Machine Vision Conference (BMVC), 2021.

C.K. Salmon, T.A. Syed, J.B. Kacerovsky, N. Alivodej, A.L. Schober, M.T. Pratte, M.P. Rosen, M. Green, A. DasGupta, H. Vali, C.A. Mandato, K. Siddiqi, and K.K. Murai. “Organizing Principles of Astrocytic Nanoarchitecture in the Mouse Cerebral Cortex,” bioRxiv, December 2021.

M. Rezanejad, M. Khodadad, H. Mahyar, H. Lombaert, M. Gruninger, D.B. Walther, and K. Siddiqi. “Medial Spectral Coordinates for 3D Shape Analysis,” arXiv preprint arXiv:2111.13295

Invited Talks

Arbel, Tal

T. Arbel, “Modelling and Propagating Uncertainties in Machine Learning for Medical Images Acquired from Patients with Neurological Diseases,” University of British Columbia (UBC) MS Connect Education Program/ CAIDA: UBC ICICS Centre for Artificial Intelligence Decision-making and Action, Seminar Series, September 2021.

T. Arbel, “Modelling and Propagating Uncertainties in Machine Learning for Medical Images of Patients with Neurological Diseases,” University of Pittsburgh (Pitt), Carnegie Mellon University (CMU) and the University of Pittsburgh Medical Center (UPMC), Virtual Seminar Series on Machine Learning in Medicine, April 2021.

T. Arbel, 2021 IEEE/CVF Computer Society Conference on Computer Vision and Pattern Recognition (CVPR) “Workshop on Medical Computer Vision,” RSIP CVPR Daily Magazine, https://www.rsipvision.com/CVPR2021-Monday/

T. Arbel, 2021 IEEE/CVF Computer Society Conference on Computer Vision and Pattern Recognition (CVPR) “Workshop on Medical Computer Vision”, RSIP Best of CVPR 2021, https://www.rsipvision.com/ComputerVisionNews-2021July/, pp. 22-25.

Caines, Peter

P. E. Caines, “Graphon Mean Field Games: A Dynamical Equilibrium Theory for Large Populations on Complex Networks,” Plenary Lecture: Canadian Applied and Industrial Mathematics Society (CAIMS), June 23rd, 2021

P. E. Caines, “Optimal Execution Problems in Single and Networked Markets: a Mean Field Game Formulation,” The Financial Mathematics/ Engineering Seminar Series, Hong Kong Polytechnic University, June 16th 2021.

P. E. Caines, “Network Mean Field Games and Market Execution Problems,” SIAM Financial Mathematics and Engineering Group Meeting (FM21), June 1st 2021.

Cooperstock, Jeremy

J. Cooperstock, “Using smartphones to answer ‘What’s around me?,’ ‘Am I crossing the street safely?’ and ‘Where’s the entrance?’,” Accessible Coding Demonstrations for Youth with Visual Impairment, Science Odyssey 2021, May 1, 2021.

Kövecses, Jozsef

J. Kövecses, “Modelling, Slip Decomposition and State Estimation for Rovers,” presented at the Machine-Ground Interaction Workshop, University of Wisconsin-Madison, online, Sep. 21, 2021.

J. Kövecses, “Co-Simulation of Multibody Systems With Contact Using Reduced Interface Models,” presented in the spotlight session of the ASME Journal of Computational and Nonlinear Dynamics at the 2021 ASME International Design Engineering Technical Conferences, online, August 19, 2021.

J. Kövecses, “Simulation Aspects and Challenges for Space Robotic Systems,” plenary talk at the IEEE 21st International Symposium on Computational Intelligence and Informatics (CINTI 2021), November 18-20, 2021.

Kry, Paul

P. Kry, “Advice on Writing and Style for Computer Science Students,” Tomatograph, University of Toronto, 4 December 2021.

P. Kry, “Artistic Aerial Robots,” IEEE Ottawa Section AGM Keynote Presentation, 26 November 2021.

Lin, Hsiu-Chin

H.-C. Lin, Invited Speaker, Conference on Robotics and Vision.

H.-C. Lin, Invited Speaker, International Conference on Robotics and Automation, Legged Robotics Workshop.

Meger, David

D. Meger, “McGill Robotics,” Invited talk at the NSERC Canadian Robotics Network “Struggle to Success” workshop. Dec 13th, 2021.

D. Meger, “Five Sense Robotics,” Invited video presentation at the Facebook AI Research “Future of Tactile Sensing” workshop. Nov 15th, 2021.

D. Meger, “Intelligent Robotics via Accurate Software Simulation,” Invited talk at the CM Labs Vortex Day. June 17th, 2021.

D. Meger, “Autonomous Driving via Multimodal Learning,” Invited talk at the NSERC Canadian Robotics Network Annual General Meeting. May 18th, 2021.

Contributed presentations:

D. Meger, “Active 3d shape reconstruction from vision and touch” at NeurIPS 2021.

D. Meger, “A deep reinforcement learning approach to marginalized importance sampling with the successor representation” at ICML 2021.

D. Meger, “Multimodal dynamics modeling for off-road autonomous vehicles” at ICRA 2021.

D. Meger, “Learning intuitive physics with multimodal generative models” at AAAI 2021.

D. Meger, “Seeing through your skin: Recognizing objects with a novel visuotactile sensor” at WACV 2021.

D. Meger, “Latent attention augmentation for robust autonomous driving policies” at IROS 2021.

D. Meger, “Trajectory-constrained deep latent visual attention for improved local planning in presence of heterogeneous terrain” at IROS 2021.

D. Meger, “Learning assisted identification of scenarios where network optimization algorithms under-perform” at GLOBECOM 2021.

D. Meger, “Robotic object manipulation with full-trajectory gan-based imitation learning” at CRV 2021.

D. Meger, “An Autonomous Probing System for Collecting Measurements at Depth from Small Surface Vehicles” at OCEANS 2021.

Mahajan, Aditya

A. Mahajan, “Approximate planning and learning for partially observed systems,” Keynote Talk, 5th International Conference on Information Systems and Computer Networks (ISCON), Oct 2021.

A. Mahajan, “Reinforcement learning in stationary mean-field games,” Machine learning and mean-field games, Virtual, Nov 2021.

A. Mahajan, “Robustness and sample complexity of model-based MARL for general-sum Markov games,” Workshop on Agents behavior in combinatorial game theory, Centre de recherches mathématiques (CRM), Montréal, QC, Canada, Nov 2021.

A. Mahajan, “Learning to control networked-coupled subsystems with unknown dynamics,” Workshop on Mean-field games on Networks, Vancouver, BC, Canada, Oct 2021.

A. Mahajan, “Approximate planning and learning for partially observed systems,” Reinforcement learning and stochastic control in queues and networks (ReStoq) Workshop, WiOpt, Temple University, Oct 2021.

A. Mahajan, “Approximate planning and learning for partially observed systems,” Polytechnique Montreal, Montreal, QC, June 2021.

A. Mahajan, “Approximate planning and learning for partially observed systems,” University of Waterloo, Waterloo, ON, June 2021.

A. Mahajan, “Robustness of Markov perfect equilibrium to model approximations in general-sum dynamic games,” IEEE Indian Control Conference, Mumbai, India, Dec 2021.

A. Mahajan, “Thompson sampling for linear quadratic mean-field games,” IEEE Conference on Decision and Control, Austin TX, Dec 2021.

Moon, AJung

A. Moon. Discussant to “RoboTruckers: The Double Threat of AI for Low-Wage Work?” by Karen Levy. Montreal Speaker Series in the Ethics of AI, Montreal. December 2021.

A. Moon. “Can development of automation technology be moulded to prevent worker displacement and/or exploitation and to improve worker conditions?” Robotics: Science and Systems Conference 2021: Workshop on Accessibility of Robot Programming and the Work of the Future, Virtual. July 2021.

A. Moon. “Ethical Design of Intelligent Machines.” Meet McGill Event, Canada. May 2021.

A. Moon. “Putting AI Ethics Into Practice.” Mila TechAide AI Conference, Montreal, Canada. May 2021.

A. Moon. “Killer Robots 101.” Mila AI Governance Reading Group, Montreal, Canada. May 2021.

A. Moon. “Robots & AI Ethics.” McGill AI Learnathon, Montreal, Canada. March 2021.

A. Moon. Panelist, McGill TechWeek Engineering Faculty Panel, Montreal, Canada. January 2021.

A. Moon. Moderator, Workshop, IEEE/RSJ IROS Workshop on the Roles of Robotics in Achieving the UN Sustainable Development Goals. October 2021.

S. Rismani and A. Moon. IEEE International Symposium on Technology and Society, 2021.

Nowrouzezahrai, Derek

D. Nowrouzezahrai. “Differentiable Physics: computer graphics as an inductive bias.” Invited Talk at the 2021 Mila TechAide Conference. April 2021.

D. Nowrouzezahrai. “Differentiable Physics: computer graphics as an inductive bias.” Invited Talk at the University of Maryland -- Department of Computer Science Colloquium Talk. October 2021.

D. Nowrouzezahrai. “The Future of Retail and AI.” Invited Solo Panelist at the Conseil Québécois du Commerce de Détail’s TAG conference. November 2021.

D. Nowrouzezahrai. “Differentiable Physics: computer graphics as an inductive bias.” Headline Speaker at the Toronto Geometry Colloquium. November 2021.

D. Nowrouzezahrai. Invited Research Panelist at Huawei Canada Research Summit. December 2021.

Pineau, Joelle

J. Pineau “Building Reproducible, Reusable, and Robust Deep Reinforcement Learning Systems,” Keynote talk at Women in Data Science conference. March 2021.

J. Pineau. “Safe and Sound Reinforcement Learning,” Keynote talk at ALT conference. March 2021.

J. Pineau. Keynote talk at World Summit AI Americas.

J. Pineau. “The Consequences of Massive Scaling in ML,” Invited panel (plenary) NeurIPS 2021. Dec 2021.

J. Pineau. “What makes for an interesting RL problem?” Invited talk. NeurIPS 2021 workshop on Ecological Theory of RL. Dec 2021.

J. Pineau. Invited talk at CIFAR’s Reinforcement Learning Summer School.

J. Pineau. “Building Reproducible, Reusable, and Robust Deep Reinforcement Learning Systems,” Invited talk at UT Austin. Feb 2021.

J. Pineau. “Building Reproducible, Reusable, and Robust Deep Reinforcement Learning Systems,” Invited talk at NYU. Feb 2021.

Sharf, Inna

I. Sharf. “Path Planning Problems for Timber-Harvesting Machinery”, Ben-Gurion University, Israel, invited speaker, ABC Robotics Seminar, virtual, April 26, 2021.

I. Sharf. “Towards Greater Autonomy of Timber-Harvesting Machinery”, CMLabs, Montreal, invited speaker, virtual, May 6, 2021.

I. Sharf. “Towards Greater Autonomy of Timber-Harvesting Machinery”, University of Laval, Quebec, invited speaker, FORAC seminars, virtual, June 8, 2021.

Siddiqi, Kaleem

K. Siddiqi. “Seeing through the heart,” International Conference on Computer Vision and Pattern Recognition (CVPR) Workshop on Medical Computer Vision. June 2021.

K. Siddiqi. “Learning Representations for Biological Structures : Insights from the Heart and the Brain” MILA Tea Talk. May 2021.

Contributed Presentation:

K. Siddiqi. “Mini-batch graphs for robust image classification”. Presented by Vineet Jain at the British Machine Vision Conference (BMVC), November 2021.

Associate Publications

Adamchuk, Viacheslav

J.V. Fontenelli, V.I. Adamchuk, M.M.C.Ferreira, L.R. Amaral, C.C.B. Guimarães, J.A.M. Demattê, and P.S.G. Magalhães. "Evaluating the synergy of three soil spectrometers for improving the prediction and mapping of soil properties in a high anthropic management area: A case of study from Southeast Brazil," Geoderma 402, 115347, 2021.

M. Saifuzzaman, V. Adamchuk, A. Biswas, and N. Rabe. "High-density proximal soil sensing data and topographic derivatives to characterise field variability," Biosystems Engineering 211, 19-34, 2, 2021.

R.-J. Vestergaard, H.B. Vasava, D. Aspinall, S. Chen, A. Gillespie, V. Adamchuk, and A. Biswas. "Evaluation of Optimized Preprocessing and Modeling Algorithms for Prediction of Soil Properties Using VIS-NIR Spectroscopy," Sensors 21 (20), 6745, 1, 2021.

A. Yari, L. Gilbert, C.A. Madramootoo, S.A. Woods, and V.I. Adamchuk. "Optimum irrigation strategy to maximize yield and quality of potato: A case study in southern Alberta, Canada," Irrigation and Drainage 70 (4), 609-621, 3, 2021.

N.M. Dhawale, V.I. Adamchuk, S.O. Prasher, and R.A. Viscarra Rossel. "Evaluating the Precision and Accuracy of Proximal Soil vis–NIR Sensors for Estimating Soil Organic Matter and Texture," Soil Systems 5 (3), 48, 4, 2021.

R. Zeitoun, V. Adamchuk, J. Warland, and A. Biswas. "Polished carbon screen-printed electrodes increase reusability and enhance performance in phosphomolybdate electrochemical detection," Journal of Electroanalytical Chemistry 890, 115229, 1, 2021.

A.A. Boatswain Jacques, V.I. Adamchuk, J. Park, G. Cloutier, J.J. Clark, and C. Miller. "Towards a machine vision-based yield monitor for the counting and quality mapping of shallots," Frontiers in Robotics and AI 8, 627067, 3, 2021.

A. Lajili, A.N. Cambouris, K. Chokmani, M. Duchemin, I. Perron, B.J. Zebarth, A. Biswas, and V.I. Adamchuk. "Analysis of four delineation methods to identify potential management zones in a commercial potato field in eastern Canada," Agronomy 11 (3), 432, 6, 2021.

D.N. Vidana Gamage, H.B. Vasava, I.B. Strachan, V.I. Adamchuk, and A. Biswas. "Comparison of Heating Strategies on Soil Water Measurement Using Actively Heated Fiber Optics on Contrasting Textured Soils," Sensors 21 (3), 962, 2021.

V. Adamchuk, K. Sudduth, and A. Biswas. "Smart Sensing Technologies for Agriculture," MDPI, 2021.

A. Yari, C.A. Madramootoo, S.A. Woods, and V.I. Adamchuk. "Using Variable-Rate Irrigation for Water and Energy Conservation and Crop Productivity; A case study in Southern Alberta, Canada." 6th Decennial National Irrigation Symposium, 6-8, December 2021, San Diego, 2021.

V.I. Adamchuk, A. Biswas, H.-H. Huang, J.E. Holland, J.A. Taylor, B. Stenberg, J. Wetterlind, K. Singh, B. Minasny, C. Fidelis, D. Yinil, T. Sanderson, D. Snoeck, and D.J. Field. "Soil Sensing," Sensing Approaches for Precision Agriculture, 93-132, 1, 2021.

Armanfard, Narges

M. Sadeghi and N. Armanfard. "Deep clustering with self-supervision using pairwise data similarities," June, 2,2021.

M. Sadeghi and N. Armanfard. "IDECF: Improved Deep Embedding Clustering With Deep Fuzzy Supervision," 2021 IEEE International Conference on Image Processing (ICIP), 1009-1013, 2021.

B. Nikpour and N. Armanfard. "Joint Selection using Deep Reinforcement Learning for Skeleton-based Activity Recognition," IEEE International Conference on Systems, Man, and Cybernetics, 2021.

H. Hojjati and N. Armanfard. "Dasvdd: Deep autoencoding support vector data descriptor for anomaly detection," arXiv preprint arXiv:2106.05410, 2021.

S.H. Safiabadi Tali, J.J. LeBlanc, Z. Sadiq, O.D. Oyewunmi, C. Camargo, B. Nikpour, N. Armanfard, S.M. Sagan, and S. Jahanshahi-Anbuhi. "Tools and techniques for severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2)/COVID-19 detection," Clinical microbiology reviews 34 (3), e00228-20, 2021.

M. Sadeghi and N. Armanfard. "Deep Successive Subspace Learning for Data Clustering," International Joint Conference on Neural Networks (IJCNN), 2021.

Cecere, Renzo

K. Khan, G. Makhoul, B. Yu, G. Jalani, I. Derish, A. Rutman, M. Cerruti, A. Schwertani, R. Cecere. "Amniotic stromal stem cell-loaded hydrogel repairs cardiac tissue in infarcted rat hearts via paracrine mediators." Journal of Tissue Engineering and Regenerative Medicine, 2021. 16. 10.1002/term.3262.

K. Khan, K. Gasbarrino, I. Mahmoud, L. Dufresne, S. Daskalopoulou, A. Schwertani, and R. Cecere. "Bioactive Scaffolds in Stem Cell-Based Therapies for Myocardial Infarction: a Systematic Review and Meta-Analysis of Preclinical Trials," Stem Cell Reviews and Reports, 2021. 10.1007/s12015-021-10186-y.

J. Solomon, E. Moss, J.-F. Morin, Y. Langlois, R. Cecere, B. Varennes, K. Lachapelle, N. Piazza, G. Martucci, M. Bendayan, P. Piankova, V. Hayman, M.-C. Ouimet, L. Rudski, and J. Afilalo. "The Essential Frailty Toolset in Older Adults Undergoing Coronary Artery Bypass Surgery." Journal of the American Heart Association, 2021. 10. 10.1161/JAHA.120.020219.

K. Ridwan, B. DeVarennes, C. Tchervenkov, D. Shum-Tim, R. Cecere, and K. Lachapelle. "Postoperative Nosocomial COVID 19 infection in Cardiac Surgery: An Uncommon event with High Mortality." CJC Open, 2021. 3. 10.1016/j.cjco.2021.05.017.

Cheung, Jackie

I. Porada, A. Sordoni, and J.C.K. Cheung. "Does Pre-training Induce Systematic Inference? How Masked Language Models Acquire Commonsense Knowledge," arXiv preprint arXiv:2112.08583, 2021.

A. Arodi and J.C.K. Cheung. "Textual Time Travel: A Temporally Informed Approach to Theory of Mind," Findings of the Association for Computational Linguistics: EMNLP 2021, 4162-4172, 2021.

J. Kabbara and J.C.K. Cheung. "Post-Editing Extractive Summaries by Definiteness Prediction," Findings of the Association for Computational Linguistics: EMNLP 2021, 3682-3692, 2021.

G. Carenini, J.C.K. Cheung, Y. Dong, F. Liu, and L. Wang. "Proceedings of the Third Workshop on New Frontiers in Summarization," Proceedings of the Third Workshop on New Frontiers in Summarization, 2021.

M. Altakrori, J.C.K. Cheung, and B.C.M. Fung. "The Topic Confusion Task: A Novel Evaluation Scenario for Authorship Attribution," Findings of the Association for Computational Linguistics: EMNLP 2021, 4242-4256, 2021.

M. Cao, Y. Dong, and J.C.K. Cheung. "Inspecting the Factuality of Hallucinated Entities in Abstractive Summarization," arXiv preprint arXiv:2109.09784, 2021.

A. Emami, I. Porada, A. Olteanu, K. Suleman, A. Trischler, and J.C.K. Cheung. "ADEPT: An adjec-

tive-dependent plausibility task," Proceedings of the 59th Annual Meeting of the Association for Computational Linguistics and the 11th International Joint Conference on Natural Language Processing (Volume 1: Long Papers), 2021.

J. Wu, Y. Xu, Y. Zhang, C. Ma, M. Coates, and J.C.K. Cheung. "Tie: A framework for embedding-based incremental temporal knowledge graph completion," Proceedings of the 44th International ACM SIGIR Conference on Research and Development in Information Retrieval, 2021.

I. Porada, K. Suleman, A. Trischler, and J.C.K. Cheung. "Modeling event plausibility with consistent conceptual abstraction," Proceedings of the 2021 Conference of the North American Chapter of the Association for Computational Linguistics: Human Language Technologies, 1732-1743, 2021.

M. Grenander, R. Belfer, E. Kochmar, I.V. Serban, F. St-Hilaire, and J.C.K. Cheung. "Deep discourse analysis for generating personalized feedback in intelligent tutor systems," Proceedings of the AAAI Conference on Artificial Intelligence 35 (17), 15534-15544, 2021.

M.H. Altakrori, J.C.K. Cheung, and B. Fung. "The Topic Confusion Task: A Novel Scenario for Authorship Attribution," arXiv preprint arXiv:2104.08530, 2021.

M. Socolof, J.C.K. Cheung, M. Wagner, T.J. O'Donnell. "Characterizing idioms: Conventionality and contingency," arXiv preprint arXiv:2104.08664, 2021.

Y. Dong, C. Bhagavatula, X. Lu, J.D. Hwang, A. Bosselut, J.C.K. Cheung, and Y. Choi. "On-the-fly attention modulation for neural generation," arXiv preprint arXiv:2101.00371, 2021.

Collins, Louis

M. Dadar, S. Mahmoud, S. Narayanan, D.L. Collins, D.L. Arnold, and J. Maranzano. "Diffusely abnormal white matter converts to T2 lesion volume in the absence of MRI-detectable acute inflammation," Brain, 2021.

N. Shafiee, M. Dadar, S. Ducharme, and L. Collins. "Automatic prediction of cognitive and functional decline using baseline MRI and cognitive scores," Alzheimer's & Dementia 17, e054217, 2021.

C. Morrison, M. Dadar, N. Shafiee, and L. Collins. "Despite heightened risk of cognitive decline, no evidence of local atrophy in people with subjective cognitive decline compared to normal controls in ADNI," Alzheimer's & Dementia 17, e054475, 2021.

M. Dadar, N. Shafiee, L. Collins, R. Camicioli, and S. Duchesne. "Subtyping mild cognitive impairment based on imaging and CSF biomarker levels," Alzheimer's & Dementia 17, e054129, 2021.

A.L. Manera, M. Dadar, L. Collins, and S. Ducharme. "Ventricle shape features as a reliable differentiator between the behavioral variant frontotemporal dementia and other dementias," Alzheimer's & Dementia 17, e053984, 2021.

V.S. Fonov, M. Dadar, A.L. Manera, S. Ducharme, and L. Collins. "Clinical subtypes of frontotemporal dementia show different patterns of cortical atrophy," Alzheimer's & Dementia 17, e054494, 2021.

N. Shafiee, M. Dadar, S. Ducharme, and L. Collins. "Automatic identification of MCI progressors significantly reduces the number of subjects in clinical trials," Alzheimer's & Dementia 17, e054664, 2021.

G. Shafiei, V. Bazinet, M. Dadar, A.L. Manera, L. Collins, A. Dagher, et al. "Atrophy patterns in sporadic and genetic behavioral variant frontotemporal dementia reflect brain network architecture" Alzheimer's & Dementia 17, e051221, 2021.

S. Duchesne, P. Gravel, and L. Collins. "System and method for estimating synthetic quantitative health values from medical images," US Patent 11,151,722, 2021.

E. St-Onge, E. Garyfallidis, and D.L. Collins. "Fast Tractography Streamline Search," International Workshop on Computational Diffusion MRI, 82-95, 2021.

É. Léger, H.E. Gueziri, D.L. Collins, T. Popa, and M. Kersten-Oertel. "Evaluation of Low-Cost Hardware Alternatives for 3D Freehand Ultrasound Reconstruction in Image-Guided Neurosurgery," International Workshop on Advances in Simplifying Medical Ultrasound, 106-115, 2021.

C. Paquola, J. Royer, L.B. Lewis, C. Lepage, T. Glatard, K. Wagstyl, J. DeKraker, P.-J. Toussaint, S.L. Valk, L. Collins, A.R. Khan, K. Amunts, A.C. Evans, T. Dickscheid, and B. Bernhardt. "The BigBrainWarp toolbox for integration of BigBrain 3D histology with multimodal neuroimaging," Elife 10, e70119, 2021.

M. Dadar, A.L. Manera, V.S. Fonov, S. Ducharme, and D.L. Collins. "MNI-FTD templates, unbiased average templates of frontotemporal dementia variants," Scientific data 8 (1), 1-10, 2021.

K. Parmar, V.S. Fonov, Y. Naegelin, M. Amann, J. Wuerfel, D.L. Collins, et al. "Regional cerebellar volume loss predicts future disability in multiple sclerosis patients," The Cerebellum, 1-15, 2021.

A.L. Fernandez Cruz, C.M. Chen, R. Sanford, D.L. Collins, M.J. Brouillette, et al. "Multimodal neuroimaging markers of variation in cognitive ability in older HIV+ men," Plos one 16 (7), e0243670, 2021.

A.L. Manera, M. Dadar, J.C. Van Swieten, B. Borroni, R. Sanchez-Valle, F. Moreno, R. Laforce Jr, C. Graff, (...), and D.L. Collins. "MRI data-driven algorithm for the diagnosis of behavioural variant frontotemporal dementia," Journal of Neurology, Neurosurgery & Psychiatry 92 (6), 608-616, 2021.

A.P. Binette, G. Theaud, F. Rheault, M. Roy, D.L. Collins, J. Levin, H. Mori, et al. "Bundle-specific associations between white matter microstructure and Aβ and tau pathology in preclinical Alzheimer's disease," Elife 10, e62929, 2021.

A.P. Binette, É. Vachon-Presseau, J. Morris, R. Bateman, T. Benzinger, (...), D.L. Collins, et al. "Amyloid and tau pathology associations with personality traits, neuropsychiatric symptoms, and Cognitive Lifestyle in the Preclinical Phases of Sporadic and Autosomal Dominant Alzheimer's Disease," Biological psychiatry 89 (8), 776-785, 2021.

D.H. Tran, A. Winkler-Schwartz, M. Tuznik, H.-E. Gueziri, D.A. Rudko, A. Reich, R. Yilmaz, B. Karlik, D.L. Collins, A. Del Maestro, and R. Del Maestro. "Quantitation of Tissue Resection Using a Brain Tumor Model and 7-T Magnetic Resonance Imaging Technology," World Neurosurgery 148, e326-e339, 2021.

M. Dadar and D.L. Collins. "BISON: Brain tissue segmentation pipeline using T1-weighted magnetic resonance images and a random forest classifier," Magnetic Resonance in Medicine 85 (4), 1881-1894, 2021.

H.E. Gueziri, O. Rabau, C. Santaguida, D.L. Collins. "Evaluation of an ultrasound-based navigation system for spine neurosurgery: a porcine cadaver study," Frontiers in Oncology 11, 619204, 2021.

S. Nolvi, J.J. Tuulari, J. Pelto, D.J. Bridgett, E. Eskola, S.J. Lehtola, N. Hashempour, (...), D.L. Collins, and H. Karlsson. "Neonatal amygdala volumes and the development of self-regulation from early infancy to toddlerhood." Neuropsychology 35 (3), 285, 2021.

I.J. Gerard, M. Kersten-Oertel, J.A. Hall, D. Sirhan, and D.L. Collins. "Brain shift in neuronavigation of brain tumors: an updated review of intra-operative ultrasound applications," Frontiers in Oncology 10, 618837, 2021.

I. Reinertsen, D.L. Collins, and S. Drouin. "The essential role of open data and software for the future of ultrasound-based neuronavigation," Frontiers in Oncology 10, 619274, 2021.

M. Dadar, S. Narayanan, D.L. Arnold, D.L. Collins, and J. Maranzano. "Conversion of diffusely abnormal white matter to focal lesions is linked to progression in secondary progressive multiple sclerosis," Multiple Sclerosis Journal 27 (2), 208-219, 2021.

H. Acosta, J.J. Tuulari, K. Kantojärvi, J.D. Lewis, N. Hashempour, N.M. Scheinin, S.J. Lehtola, V.S. Fonov, D.L. Collins, A. Evans, R. Parkkola, T. Lähdesmäki, J. Saunavaara, H. Merisaari, L. Karlsson, T. Paunio, and H. Karlsson. "A variation in the infant oxytocin receptor gene modulates infant hippocampal volumes in association with sex and prenatal maternal anxiety," Psychiatry Research: Neuroimaging 307, 111207, 2021.

C. Morrison, M. Dadar, N. Shafiee, and L. Collins. "Local Atrophy Observed in Subjective Cognitive Decline Varies Based on Questionnaire Employed in ADNI," Innovation in Aging 5 (Supplement_1), 635-635, 2021.

C. Morrison, M. Dadar, S. Villeneuve, and D.L. Collins. "White matter hyperintensities may be an early marker for age-related cognitive decline in the ADNI cohort," bioRxiv, 2021.

G. Shafiei, V. Bazinet, M. Dadar, A.L. Manera, D.L. Collins, A. Dagher, et al. "Global network structure and local transcriptomic vulnerability shape atrophy in sporadic and genetic behavioral variant frontotemporal dementia," bioRxiv, 2021.

V. Fonov, M. Dadar, D.L. Collins, PREVENT-AD Research Group. "DARQ: Deep learning of quality control for stereotaxic registration of human brain MRI," bioRxiv, 2021.

M. Dadar, S. Mahmoud, S. Narayanan, D.L. Collins, D. Arnold, and J. Maranzano. "Diffusely abnormal white matter converts to T2 lesion volume in the absence of acute inflammation," bioRxiv, 2021.

P. Khandelwal, D.L. Collins, and K. Siddiqi. "Spine and Individual Vertebrae Segmentation in Computed Tomography Images Using Geometric Flows and

Shape Priors," Frontiers in Computer Science, 66, 2021.

C. Morrison, M. Dadar, N. Shafiee, S. Villeneuve, D.L. Collins, et al. "Regional atrophy and cognitive decline depend on definition of subjective cognitive decline," medRxiv, 2021.

M. Dadar, A.L. Manera, and D.L. Collins. "White Matter Hyperintensities, Grey Matter Atrophy, and Cognitive Decline in Neurodegenerative Diseases," bioRxiv, 2021.

N. Shafiee, M. Dadar, S. Ducharme, D.L. Collins, et al. "Automatic Prediction of Cognitive and Functional Decline Can Significantly Decrease the Number of Subjects Required for Clinical Trials in Early Alzheimer's Disease," Journal of Alzheimer's Disease 84 (3), 1071-1078, 2021.

A. Cárdenas-De-La-Parra, J.D. Lewis, V.S. Fonov, K.N. Botteron, R.C. McKinstry, G. Gerig, J.R. Pruett Jr, S.R. Dager, J.T. Elison, M.A. Styner, A.C. Evans, J. Piven, D.L. Collins, and IBIS Network. "A voxel-wise assessment of growth differences in infants developing autism spectrum disorder," NeuroImage: Clinical 29, 102551, 2021.

J. Tremblay-Mercier, C. Madjar, S. Das, A. Pichet Binette, S.O.M. Dyke, P. Étienne, M.-E. Lafaille-Magnan, J. Remz, P. Bellec, D.L. Collins, M.N. Rajah, V. Bohbot, J.-M. Leoutsakos, Y. Iturria-Medina, J. Kat, R.D. Hoge, S. Gauthier, C.L. Tardif, M.M. Chakravarty, J.-B. Poline, P. Rosa-Neto, A.C. Evans, S. Villeneuve, J. Poirier, and J.C.S. Breitner. "PREVENT-AD Research Group Open science datasets from PREVENT-AD, a longitudinal cohort of pre-symptomatic Alzheimer's disease," NeuroImage: Clinical 31, 102733, 2021.

C.J. Anor, M. Dadar, D.L. Collins, and M.C. Tartaglia. "The Longitudinal Assessment of Neuropsychiatric Symptoms in Mild Cognitive Impairment and Alzheimer's Disease and Their Association With White Matter Hyperintensities in the National Alzheimer's Coordinating Center's Uniform Data Set," Biological Psychiatry: Cognitive Neuroscience and Neuroimaging 6 (1), 70-78, 2021.

Dimitrakopoulos, Roussos

C. Both and R. Dimitrakopoulos. "Applied Machine Learning for Geometallurgical Throughput Prediction—A Case Study Using Production Data at the Tropicana Gold Mining Complex," Minerals 11 (11), 1257, 1, 2021.

A. Kumar and R. Dimitrakopoulos. "Production scheduling in industrial mining complexes with incoming new information using tree search and deep reinforcement learning," Applied Soft Computing 110, 107644, 4, 2021.

M. LaRoche-Boisvert, R. Dimitrakopoulos, and J.A. Ferland. "Simultaneous production scheduling and transportation optimization from mines to port under uncertain material supply," Resources Policy 73, 102150, 3, 2021.

L. Yao, R. Dimitrakopoulos, and M. Gamache. "Training image free high-order stochastic simulation based on aggregated kernel statistics," Mathematical Geosciences 53 (7), 1469-1489, 7, 2021.

R. Dimitrakopoulos. "Sustainable development, digitalization, mineral value chains, and new paradigm shifts," Journal of the Southern African Institute of Mining and Metallurgy 121 (6), 2021.

J.P. de Carvalho and R. Dimitrakopoulos. "Integrating production planning with truck-dispatching decisions through reinforcement learning while managing uncertainty," Minerals 11 (6), 587, 3, 2021.

L. Yao, R. Dimitrakopoulos, and M. Gamache. "Learning high-order spatial statistics at multiple scales: A kernel-based stochastic simulation algorithm and its implementation," Computers & Geosciences 149, 104702, 3, 2021.

M. LaRoche-Boisvert and R. Dimitrakopoulos. "An application of simultaneous stochastic optimization at a large open-pit gold mining complex under supply uncertainty," Minerals 11 (2), 172, 2, 2021.

M. LaRoche-Boisvert and R. Dimitrakopoulos. "An Application of Simultaneous Stochastic Optimization at a Large Open-Pit Gold Mining Complex under Supply Uncertainty." Minerals 2021, 11, 172, 2021.

Hayward, Vincent

Y. Massalim, Z. Kappassov, H.A. Varol, and V. Hayward. "Robust detection of absence of slip in robot hands and feet," IEEE Sensors Journal 21 (24), 27897-27904, 2021.

Y. Chen, M. Amberg, F. Giraud, V. Hayward, and B. Lemaire-Semail. "Identification and control of piezoelectric benders for skin mechanical impedance estimation," 2021 23rd European Conference on Power Electronics and Applications (EPE'21 ECCE Europe), 2021.

L.P. Kirsch, X.E. Job, M. Auvray, and V. Hayward. "Harnessing tactile waves to measure skin-to-skin interactions," Behavior Research Methods 53 (4), 1469-1477, 2021.

C. Richards, N. Misdariis, R. Cahen, D. Faux, and V. Hayward. "Vibratory Detection Thresholds for the Spine, Clavicle and Sternum*," 2021 IEEE World Haptics Conference (WHC), 346-346, 2021.

T. Daunizeau, D. Gueorguiev, S. Haliyo, and V. Hayward. "Phononic crystals applied to localised surface haptics," IEEE Transactions on Haptics 14 (3), 668-674, 2021.

U.B. Rongala, A. Seyfarth, V. Hayward, and H. Jorntell. "The dynamics of touch sensing studied in a mass-spring-damper model of the skin," bioRxiv, 2021.

Husty, Manfred

M. Husty. "Robot Kinematics – The Algebraic Point of View," Invited Lecture at the 13th International Conference on Automated Deduction in Geometry. Electronic Proceedings in Theoretical Computer Science, 2021. 352. 1-3. 10.4204/EPTCS.352.1.

T. Stigger, J. Siegele, D. Scharler, M. Pfurner, and M. Husty. "Analysis of a 3-RUU Parallel Manipulator." 2021.

A. Nayak, M. Pfurner, H. Shen, and M. Husty. "Algebraic Analysis of 3-RRC Parallel Manipulators." 2021. 10.1007/978-3-030-50975-0_21.

I. Birlescu, M. Husty, C. Vaida, B. Gherman, I. Ulinici, R. Bogateanu, and D. Pisla, Doina. "Motion Parameterization of Parallel Robots Used in Lower Limb Rehabilitation." 2021. 10.1007/978-3-030-50975-0_8.

M. Rotzoll, M. Hayes, M. Husty, and M. Pfurner. "A General Method for Determining Algebraic Input-Output Equations for Planar and Spherical 4R Linkages." 2021. 10.1007/978-3-030-50975-0_12.

Liu, Xiu

Y. Liu, L. Jiang, L. Kong, Q. Xiang, X. Liu, and G. Chen. "Wi-Fruit: See Through Fruits with Smart Devices," Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies, 2021.

Y. Mo, Y. Hua, P. Li, Q. Cao, and X. Liu. "A Cost-Efficient Metadata Scheme for High-Performance Deduplication Systems," 2021 IEEE 23rd Int Conf on High Performance Computing & Communications; 7th Int Conf on Data Science & Systems; 19th Int Conf on Smart City; 7th Int Conf on Dependability in Sensor, Cloud & Big Data Systems & Application (HPCC/DSS/SmartCity/DependSys), 2021.

X. Li, L. Chang, and X. Liu. "QHash: An efficient hashing algorithm for low-variance image deduplication," 2021 IEEE 23rd Int Conf on High Performance Computing & Communications; 7th Int Conf on Data Science & Systems; 19th Int Conf on Smart City; 7th Int Conf on Dependability in Sensor, Cloud & Big Data Systems & Application (HPCC/DSS/SmartCity/DependSys), 2021.

X. Zhang, H. Li, X. Chen, and X. Liu. "Impact Patterns of Combining Model Pruning and Continual Learning on Model Performance," 2021 IEEE Third International Conference on Cognitive Machine Intelligence (CogMI), 2021.

C. Chen, S. Zheng, X. Chen, E. Dong, X.S. Liu, H. Liu, and D. Dou. "Generalized DataWeighting via Class-Level Gradient Manipulation," Advances in Neural Information Processing Systems 34, 14097-14109, 2021.

Z. Wang, L. Kong, X. Liu, and G. Chen. "Embracing Channel Estimation in Multi-Packet Reception of ZigBee," IEEE Transactions on Mobile Computing, 2021.

Y. Hu, Z. Zhu, S. Song, X. Liu, and Y. Yu. "Calculus of Consent via MARL: Legitimating the Collaborative Governance Supplying Public Goods," arXiv preprint arXiv:2111.10627, 2021.

F. Gu, M.H. Chung, M. Chignell, S. Valaee, B. Zhou, and X. Liu. "A survey on deep learning for human activity recognition," ACM Computing Surveys (CSUR) 54 (8), 1-34, 2021.

F. Gu, J. Niu, L. Jiang, X. Liu, and G.P. Hancke. "SafePath: Exploiting Ubiquitous Smartphones to Avoid Vehicle–Pedestrian Collision," IEEE Internet of Things Journal 9 (9), 6763-6777, 2021.

X. Li, L. Chang, and X. Liu. "CE-Dedup: Cost-effective convolutional neural nets training based on image deduplication," 2021 IEEE Intl Conf on Parallel & Distributed Processing with Applications, Big Data & Cloud Computing, Sustainable Computing & Communications, Social Computing & Networking (ISPA/BDCloud/SocialCom/SustainCom), 2021.

F. Lyu, X. Tang, H. Guo, R. Tang, X. He, R. Zhang, and X. Liu. “Memorize, Factorize, or be Na\” ive: Learning Optimal Feature Interaction Methods for CTR Prediction,” arXiv preprint arXiv:2108.01265, 2021.

D. Tang, L. Li, J. Ma, X. Liu, Z. Qi, and H. Guan. “gRemote: Cloud rendering on GPU resource pool based on API-forwarding,” Journal of Systems Architecture 116, 102055, 2021.

C. Ma, L. Ma, Y. Zhang, H. Wu, X. Liu, and M. Coates. “Knowledge-enhanced Top-K recommendation in poincaré ball, “Proceedings of the AAAI Conference on Artificial Intelligence 35 (5), 4285-4293, 2021.

H. Wu, C. Ma, B. Mitra, F. Diaz, and X. Liu. “Multi-FR: A Multi-Objective Optimization Method for Achieving Two-sided Fairness in E-commerce Recommendation,” arXiv preprint arXiv:2105.02951, 2021.

X. Liu, Y. Hua, X. Liu, L. Yang, and Y. Sun. “Design and Implementation of Smooth Renewable Power in Cloud Data Centers,” IEEE Transactions on Cloud Computing, 2021.

P. Yang, L. Kong, M. Qiu, X. Liu, and G. Chen. “Compressed imaging reconstruction with sparse random projection,” ACM Transactions on Multimedia Computing, Communications, and Applications (TOMM), 2021.

X. Li, C. Desrosiers, and X. Liu. “Out-of-distribution detection using vision transformers,” 2021.

X. Sun, C.J. Xue, J. Yu, T.W. Kuo, and X. Liu. “Accelerating data filtering for database using FPGA,” Journal of Systems Architecture 114, 101908, 2021.

R. Chen, X. Wang, and X. Liu. “Smart futures based resource trading and coalition formation for real-time mobile data processing,” IEEE Transactions on Services Computing, 2021.

Mongrain, Rosaire

S. McLennan, G. Soulez, R, Mongrain, H. Mohammadi, M. Pfister, S. Lessard, G. Jabbour, and E. Therasse. “Impact of Calcification Modelling to Improve Image Fusion Accuracy for Endovascular Aortic Aneurysm Repair.” International Journal for Numerical Methods in Biomedical Engineering, 2021. 38. 10.1002/cnm.3556.

T. Cotter, M. Driscoll, and R. Mongrain. “Combining Freehand and Controlled Movement for Calculating Surgical Simulator Forces.” 2021.

T. Cotter, R. Mongrain, and M. Driscoll. “Discectomy Tool Mechanical Testing in Cadaveric Spine.” 2021.

A. Alakhtar, A. Emmott, C. Hart, R. Mongrain, R. Leask, and K. Lachapelle. “3D printed ascending aortic simulators with physiological fidelity for surgical simulation.” BMJ Simulation and Technology Enhanced Learning, 2021. 7. bmjstel-2021. 10.1136/bmjstel-2021-000868.

T. Cotter, M. Driscoll, R. Mongrain. “Mechanics of Lumbar Discectomy Tool Insertion for a Surgical Simulator.” 2021. 10.13140/RG.2.2.16237.72161.

Panangaden, Prakash

R. Mardare, P. Panangaden and G. Plotkin. “Fixed points for Quantitative Equational Logics” Proceedings of the 2021 ACM-IEEE Symposium on Logic in Computer Science (LICS). [The names of the authors appear in alphabetical order.]

P.H. Azevedo de Amorim, D. Kozen, R. Mardare, P. Panangaden, and M. Roberts. “Universal Semantics for the Stochastic Lambda-Calculus,” Proceedings of the 2021 ACMIEEE Symposium on Logic in Computer Science (LICS). [The names of the authors appear in alphabetical order.]

B. Balle, C. Lacroce, P. Panangaden, D. Precup and G. Rabusseau. “Optimal Spectral-Norm Minimization of Weighted Finite-Automata,” Proceedings of the International Colloquium on Automata Languages and Programming (ICALP), 2021. [The names of the authors appear in alphabetical order.]

G. Bacci, R. Mardare, P. Panangaden, and G. Plotkin. “Tensor of Quantitative Equational Theories,” Proceedings of the Ninth Conference on Algebra and Coalgebra in Computer Science (CALCO), Salzburg, Austria, 2021. [Best paper award] [The names of the authors appear in alphabetical order.]

C. Lacroce, P. Panangaden, and G. Rabusseau. “Extracting Weighted Automata for Approximate Minimization in Language Modelling,” Proceedings of the Fifteenth International Conference on Grammatical Inference, published as Proceedings of Machine Learning Research 153:92-112, 2021. [The names of the authors appear in alphabetical order.]

P.S. Castro, T. Kastner, P. Panangaden, and M. Rowland. “MICo: Improved representations via sampling-based state similarity for Markov decision processes, proceedings of the Thirty-Fifth Conference on Neural Information Processing Systems (NeurIPS), 2021. [The names of the authors appear in alphabetical order.]

A. Kaznatcheev and P. Panangaden. “Weighted automata are compact and actively learnable,” Inf. Process. Lett. 171: 106133 (2021).

R. Furber, R. Mardare, P. Panangaden, and D.S. Scott. “Interpreting Lambda Calculus in Domain-Valued Random Variables,” CoRR abs/2112.06339 (2021).

Pike, Bruce

Z.W. Hawks, A. Todorov, N. Marrus, T. Nishino, M. Talovic, M.B. Nebel, J.B. Girault, S. Davis, S. Marek, B.A. Seitzman, A.T. Eggebrecht, J. Elison, S. Dager, M.W. Mosconi, L. Tychsen, A.Z. Snyder, K. Botteron, A. Estes, A. Evans, G. Gerig, H.C. Hazlett, R.C. McKinstry, J. Pandey, R.T. Schultz, M. Styner, J.J. Wolff, L. Zwaigenbaum, L. Markson, S.E. Petersen, J.N. Constantino, D.A. White, J. Piven, J.R. Pruett, and IBIS Network “A Prospective Evaluation of Infant Cerebellar-Cerebral Functional Connectivity in Relation to Behavioral Development in Autism Spectrum Disorder,” Biological Psychiatry Global Open Science, 2021, ISSN 2667-1743, https://doi.org/10.1016/j.bpsgos.2021.12.004.

R.L. Krüger, C.M. Clark, A.M. Dyck, T.J. Anderson, F. Clement, P.J. Hanly, H.M. Hanson, M.D. Hill, D.B. Hogan, J. Holroyd-Leduc, R.S. Longman, M. McDonough, G.B. Pike, J.M. Rawling, T. Sajobi, and M.J. Poulin. “The Brain in Motion II Study: study protocol for a randomized controlled trial of an aerobic exercise intervention for older adults at increased risk of dementia,” Trials 22 (1), 1-18, 2021.

B. Cheng, C. Bing, T.H. Chu, S. Alzahrani, S. Pichardo, and G.B. Pike. “Simultaneous Localized Brain Mild Hyperthermia and Blood-Brain Barrier Opening via Feedback-Controlled Transcranial MR-Guided Focused Ultrasound and Microbubbles,” IEEE Transactions on Biomedical Engineering 69 (6), 1880-1888, 2021.

Y. Gao, Z. Xiong, A. Fazlollahi, P.J. Nestor, V. Vegh, F. Nasrallah, C. Winter, G.B. Pike, S. Crozier, F. Liu, and H. Sun. “Instant magnetic tissue field and susceptibility mapping from MR raw phase using Laplacian enabled deep neural networks,” arXiv preprint arXiv:2111.07665, 2021.

Y. Gao, Z. Xiong, A. Fazlollahi, P.J. Nestor, V. Vegh, F. Nasrallah, C. Winter, G.B. Pike, S. Crozier, F. Liu, and H. Sun. “Instant tissue field and magnetic susceptibility mapping from MR raw phase using Laplacian enabled deep neural networks,” arXiv e-prints, arXiv: 2111.07665, 2021.

Y. Gao, M. Cloos, F. Liu, S. Crozier, G.B. Pike, and H. Sun. “Accelerating quantitative susceptibility and R2* mapping using incoherent undersampling and deep neural network reconstruction,” Neuroimage 240, 118404, 2021.

J. Gunderson, E. Worthley, R. Grzadzinski, C. Burrows, A. Estes, L. Zwaigenbaum, K. Botteron, S. Dager, H. Hazlett, R. Schultz, J. Piven, J. Wolff, and IBIS Network. “Social and non-social sensory responsivity in toddlers at high-risk for autism spectrum disorder,” Autism Research 14 (10), 2143-2155, 2021.

C.D. Rowley, J.S.W. Campbell, Z. Wu, I.R. Leppert, D.A. Rudko, G.B. Pike, and C.L. Tardif, “A model-based framework for correcting inhomogeneity effects in magnetization transfer saturation and inhomogeneous magnetization transfer saturation maps,” Magnetic Resonance in Medicine 86 (4), 2192-2207, 2021.

B. Tunç, J. Pandey, T. St. John, S.S. Meera, J.E. Maldarelli, L. Zwaigenbaum, H.C. Hazlett, S.R. Dager, K.N. Botteron, J.B. Girault, R.C. McKinstry, R. Verma, J.T. Elison, J.R. Pruett Jr, J. Piven, A.M. Estes, R.T. Schultz, and IBIS Network. “Diagnostic shifts in autism spectrum disorder can be linked to the fuzzy nature of the diagnostic boundary: a data-driven approach,” Journal of Child Psychology and Psychiatry 62 (10), 1236-1245, 2021.

M.E. MacDonald and G.B. Pike. “MRI of healthy brain aging: A review,” NMR in Biomedicine 34 (9), e4564, 2021.

R.E. Sondergaard, C.P. Rockel, F. Cortese, Y. Jasaui, T.M. Pringsheim, J.R. Sarna, O. Monchi, A.F. Sadikot, G.B. Pike, and D. Martino. “Microstructural abnormalities of the dentatorubrothalamic tract in cervical dystonia,” Movement Disorders 36 (9), 2192-2198, 2021.

R.J. Williams, E.C. Brown, D.L. Clark, G.B. Pike, and R. Ramasubbu. “Early post-treatment blood oxygenation level-dependent responses to emotion processing associated with clinical response to pharmacological treatment in major depressive disorder,” Brain and behavior 11 (8), e2287, 2021.

C.A. Burrows, J.W. Bodfish, J.J. Wolff, E.P. Vollman,

M.R. Altschuler, K.N. Botteron, S.R. Dager, A.M. Estes, H.C. Hazlett, J.R. Pruett Jr, R.T. Schultz, L. Zwaigenbaum, J. Piven, J.T. Elison, and IBIS Network. “Cataloguing and characterizing interests in typically developing toddlers and toddlers who develop ASD,” Autism Research 14 (8), 1710-1723, 2021.

I.R. Leppert, D.A. Andrews, J.S.W. Campbell, D.J. Park, G.B. Pike, J.R. Polimeni, and C.L. Tardif, “Efficient whole-brain tract-specific T1 mapping at 3T with slice-shuffled inversion-recovery diffusion-weighted imaging,” Magnetic Resonance in Medicine 86 (2), 738-753, 2021.

S.S. Meera, K. Donovan, J.J. Wolff, L. Zwaigenbaum, J.T. Elison, T. Kinh, M.D. Shen, A.M. Estes, H.C. Hazlett, L.R. Watson, G.T. Baranek, M.R. Swanson, T. St John, C.A. Burrows, R.T. Schultz, S.R. Dager, K.N. Botteron, J. Pandey, J. Piven, and IBIS Network. “Towards a data-driven approach to screen for autism risk at 12 months of age,” Journal of the American Academy of Child & Adolescent Psychiatry 60 (8), 968-977, 2021.

I.J. Tagge, I.R. Leppert, D. Fetco, J.S. Campbell, D.A. Rudko, N. Stikov, G.B. Pike, P.S. Giacomini, D.L. Arnold, and S. Narayanan. “Reduced Myelin Content Preceding Acute White Matter Lesions is Associated with Permanent Tissue Loss,” Multiple Scleroisis Journal 27 (1_ SUPPL), 73-73, 2021.

R.J. Williams, M.E. MacDonald, E.L. Mazerolle, and G.B. Pike. “The relationship between cognition and cerebrovascular reactivity: implications for task-based fMRI,” Frontiers in Physics 9, 157, 2021.

I.E. Sønderby, D. Van der Meer, C. Moreau, T. Kaufmann, G.B. Walters, (...), G.B. Pike, et al. “1q21. 1 distal copy number variants are associated with cerebral and cognitive alterations in humans,” Translational psychiatry 11 (1), 1-16, 2021.

E.L. Mazerolle, R. Warwaruk-Rogers, P. Romo, T. Sankar, S. Scott, C.P. Rockel, S. Pichardo, D. Martino, Z.H.T. Kiss, and G.B. Pike. “Diffusion imaging changes in the treated tract following focused ultrasound thalamotomy for tremor,” Neuroimage: Reports 1 (1), 100010, 2021.

Y. Gao, X. Zhu, B.A. Moffat, R. Glarin, A.H. Wilman, G.B. Pike, S. Crozier, F. Liu, and H. Sun. “xQSM: quantitative susceptibility mapping with octave convolutional and noise-regularized neural networks,” NMR in Biomedicine 34 (3), e4461, 2021.

N. Auclair-Ouellet, A. Hanganu, E.L. Mazerolle, S.T. Lang, M. Kibreab, M. Ramezani, A. Haffenden, T. Hammer, J. Cheetham, I. Kathol, G.B. Pike, J. Sarna, D. Martino, and O. Monchi. “Action fluency identifies different sex, age, global cognition, executive function and brain activation profile in non-demented patients with Parkinson’s disease,” Journal of Neurology 268 (3), 1036-1049, 2021.

J. Cho, Y. Ma, P. Spincemaille, G.B. Pike, and Y. Wang, “Cerebral oxygen extraction fraction: comparison of dualβgas challenge calibrated BOLD with CBF and challengeβfree gradient echo QSM+ qBOLD,” Magnetic resonance in medicine 85 (2), 953-961, 2021.

A. Subotic, C.R. McCreary, F. Saad, A. Nguyen, A. Alvarez-Veronesi, A.M. Zwiers, A. Charlton, A.E. Beaudin, Z. Ismail, G.B. Pike, and E.E. Smith. “Cortical thickness and its association with clinical cognitive and neuroimaging markers in cerebral amyloid angiopathy,” Journal of Alzheimer’s Disease 81 (4), 1663-1671, 2021.

O. Oladosu, W.Q. Liu, B.G. Pike, M. Koch, L.M. Metz, and Y. Zhang, “Advanced analysis of diffusion tensor imaging along with machine learning provides new sensitive measures of tissue pathology and intra-lesion activity in multiple sclerosis,” Frontiers in Neuroscience, 540, 2021.

A. Cárdenas-De-La-Parra, J.D. Lewis, V.S. Fonov, K.N. Botteron, R.C. McKinstry, G. Gerig, J.R. Pruett Jr, S.R. Dager, J.T. Elison, M.A. Styner, A.C. Evans, J. Piven, D.L. Collins, and IBIS Network. “A voxel-wise assessment of growth differences in infants developing autism spectrum disorder,” NeuroImage: Clinical 29, 102551, 2021.

Precup, Doina

S.Y. Arnob, R. Islam, and D. Precup. “Importance of Empirical Sample Complexity Analysis for Offline Reinforcement Learning,” arXiv preprint arXiv:2112.15578, 2021.

S.Y. Arnob, R. Ohib, S. Plis, and D. Precup. “Single-shot pruning for offline reinforcement learning,” arXiv preprint arXiv:2112.15579, 2021.

S. Alver and D. Precup. “Constructing a good behavior basis for transfer using generalized policy updates,” arXiv preprint arXiv:2112.15025, 2021.

N. Ghourchian, M.A. Martinez, and D. Precup. “Device-free localization methods within smart indoor environments,” US Patent 11,212,650, 2021.

E. Aygün, L. Orseau, A. Anand, X. Glorot, V. Firoiu, L.M. Zhang, D. Precup, and S. Mourad. “Proving Theorems using Incremental Learning and Hindsight Experience Replay,” arXiv preprint arXiv:2112.10664, 2021.

M. Klissarov and D. Precup. “Flexible Option Learning,” Advances in Neural Information Processing Systems 34, 4632-4646, 2021.

D. Abel, W. Dabney, A. Harutyunyan, M.K. Ho, M. Littman, D. Precup, and S. Singh. “On the expressivity of markov reward,” Advances in Neural Information Processing Systems 34, 7799-7812, 2021.

K. Khetarpal, Z. Ahmed, G. Comanici, and D. Precup. “Temporally abstract partial models,” Advances in Neural Information Processing Systems 34, 1979-1991, 2021.

E. Bengio, M. Jain, M. Korablyov, D. Precup, and Y. Bengio. “Flow network based generative models for non-iterative diverse candidate generation,” Advances in Neural Information Processing Systems 34, 27381-27394, 2021.

M. Zhao, Z. Liu, S. Luan, S. Zhang, D. Precup, and Y. Bengio. “A consciousness-inspired planning agent for model-based reinforcement learning,” Advances in Neural Information Processing Systems 34, 1569-1581, 2021.

M. Pezeshki, O. Kaba, Y. Bengio, A.C. Courville, D. Precup, and G. Lajoie. “Gradient starvation: A learning proclivity in neural networks,” Advances in Neural Information Processing Systems 34, 1256-1272, 2021.

S. Yeasar Arnob, R. Ohib, S. Plis, and D. Precup. “Single-Shot Pruning for Offline Reinforcement Learning,” arXiv e-prints, arXiv: 2112.15579, 2021.

S. Yeasar Arnob, R. Islam, and D. Precup. “Importance of Empirical Sample Complexity Analysis for Offline Reinforcement Learning,” arXiv e-prints, arXiv: 2112.15578, 2021.

M.C. Machado, A. Barreto, and D. Precup. “Temporal abstraction in reinforcement learning with the successor representation,” arXiv preprint arXiv:2110.05740, 2021.

D. Silver, S. Singh, D. Precup, and R.S. Sutton. “Reward is enough,” Artificial Intelligence 299, 103535, 2021.

S. Fujimoto, D. Meger, D. Precup, O. Nachum, and S.S. Gu, “Why Should I Trust You, Bellman? Evaluating the Bellman Objective with Off-Policy Data,” 2021

S. Luan, C. Hua, Q. Lu, J. Zhu, M. Zhao, S. Zhang, X.W. Chang, and D. Precup, “Is Heterophily A Real Nightmare For Graph Neural Networks on Performing Node Classification?” 2021.

S. Luan, C. Hua, Q. Lu, J. Zhu, M. Zhao, S. Zhang, X.W. Chang, and D. Precup. “Is Heterophily A Real Nightmare For Graph Neural Networks To Do Node Classification?” arXiv preprint arXiv:2109.05641, 2021.

M. Gomrokchi, S. Amin, H. Aboutalebi, A. Wong, and D. Precup. “Where Did You Learn That From? Surprising Effectiveness of Membership Inference Attacks Against Temporally Correlated Data in Deep Reinforcement Learning,” arXiv preprint arXiv:2109.03975, 2021.

S. Amin, M. Gomrokchi, H. Satija, H. van Hoof, and D. Precup. “A survey of exploration methods in reinforcement learning,” arXiv preprint arXiv:2109.00157, 2021.

D. Venuto, E. Lau, D. Precup, and O. Nachum. “Policy gradients incorporating the future,” arXiv preprint arXiv:2108.02096, 2021.

H. Ishfaq, Q. Cui, V. Nguyen, A. Ayoub, Z. Yang, Z. Wang, D. Precup, and L. Yang. “Randomized Exploration in Reinforcement Learning with General Value Function Approximation,” International Conference on Machine Learning, 4607-4616, 2021.

S. Fujimoto, D. Meger, and D. Precup. “A deep reinforcement learning approach to marginalized importance sampling with the successor representation,” International Conference on Machine Learning, 3518-3529, 2021.

N. Anand and D. Precup. “Preferential Temporal Difference Learning,” arXiv preprint arXiv:2106.0650, 2021.

E. Bengio, J. Pineau, D. Precup. “Correcting momentum in temporal difference learning,” arXiv preprint arXiv:2106.03955, 2021.

B. Mazoure, P. Mineiro, P. Srinath, R.S. Sedeh, D. Precup, and A. Swaminathan. “Improving Long-Term Metrics in Recommendation Systems using Short-Horizon Reinforcement Learning,” arXiv preprint arXiv:2106.00589, 2021.

D. Toyama, P. Hamel, A. Gergely, G. Comanici, A. Glaese, Z. Ahmed, T. Jackson, S. Mourad, and D. Precup. “Androidenv: a reinforcement learning platform for android,” arXiv preprint arXiv:2105.13231, 2021.

H. Wu, K. Khetarpal, and D. Precup. “Self-supervised attention-aware reinforcement learning,” Proceedings of the AAAI Conference on Artificial Intelligence 35 (12), 10311-10319, 2021.

A. Jain, G. Patil, A. Jain, K. Khetarpal, and D. Precup. “Variance penalized on-policy and off-policy actor-critic,” Proceedings of the AAAI Conference on Artificial Intelligence 35 (9), 7899-7907, 2021.

S. Alver and D. Precup. “What is Going on Inside Recurrent Meta Reinforcement Learning Agents?” arXiv preprint arXiv:2104.14644, 2021.

V. Firoiu, E. Aygun, A. Anand, Z. Ahmed, X. Glorot, L. Orseau, L. Zhang, D. Precup, and S. Mourad. “Training a first-order theorem prover from synthetic data,” arXiv preprint arXiv:2103.03798, 2021.

B. Balle, C. Lacroce, P. Panangaden, D. Precup, and G. Rabusseau. “Optimal Spectral-Norm Approximate Minimization of Weighted Finite Automata,” arXiv preprint arXiv:2102.06860, 2021.

J.-P.R. Falet, J. Durso-Finley, B. Nichyporuk, J. Schroeter, F. Bovis, M.-P. Sormani, D. Precup, T. Arbel, and D.L. Arnold. “Estimating treatment effect for individuals with progressive multiple sclerosis using deep learning,” medRxiv, 2021.

B. Mazoure, P. Mineiro, P. Srinath, R.S. Sedeh, D. Precup, and A. Swaminathan. “Improving long-term metrics in recommendation systems using short-horizon offline rl,” arXiv preprint arXiv:2106.00589, 2021.

A. Jain, K. Khetarpal, and D. Precup. “Safe option-critic: learning safety in the option-critic architecture,” The Knowledge Engineering Review 36, 2021.

Zhao, Yaoyao Fiona

Y. Liu, H. Yang, G. Zheng, and Y.F. Zhao. “A Heterogeneous Lattice Structures Modeling Technique Supported by Multiquadric Radial Basis Function Networks,” Journal of Computational Design and Engineering, Vol,9 Issue 1, 2021.

Z. Gao, G. Dong, Y. Tang, and Y.F. Zhao. “Machine learning aided design of conformal cooling channels for injection molding,” Journal of Intelligent Manufacturing, 2021.

N. Letov, P. Velivela, S. Sun, and Y.F. Zhao. “Challenges and Opportunities in Geometric Modelling of Complex Bio-inspired 3D Objects Designed for Additive Manufacturing,” Journal of Mechanical Design, Vol 143, Issue 12, 2021.

Y. Zhang and Y.F. Zhao. “Hybrid Sparse Convolutional Neural Networks for Predicting Manufacturability of Visual Defects of Laser Powder Bed Fusion Processes,” Journal of Manufacturing Systems, 2021.

J. Li, X. Zhou, Q. Meng, M. Brochu, N. Chekir, J.J. Sixsmith, J.-Y. Hascoet, and Y.F. Zhao. “Deterministic Modelling of Solidification Microstructure Formation in Directed Energy Deposition Fabricated Ti6Al4V,” Additive Manufacturing, Vol. 46, 2021.

Y. Zhang, S. Yang, G. Dong, and Y.F. Zhao. “Predictive Manufacturability Assessment System for Laser Powder Bed Fusion Based on a Hybrid Machine Learning Model,” Additive Manufacturing, Vol 41, 2021, https://doi.org/10.1016/j.addma.2021.101946

Y. Liu, G. Zheng, N. Letov, and Y.F. Zhao. “A Survey of Modeling and Optimization Methods for Multi-Scale Heterogeneous Lattice Structures,” Journal of Mechanical Design, Vol. 143, Issue 4, 2021.

H. Dankowicz, C. Arson, Y. Kulkarni, A. Ardekani, S.H. Daly, D. Kochmann, M. Leamy, G. Seidel, T. Siegmund, P. Vlahovska, and Y.F. Zhao. “Journal Commitment to Diversity, Equity, and Inclusion,” Applied Mechanics Reviews, March 2021.

J.T. Allison, M.-A. Cardin, C. McComb, M.Y. Ren, D. Selva, C. Tucker, P. Witherell, and Y.F. Zhao. “Artificial Intelligence and Engineering Design,” Journal of Mechanical Design Special Issue on Artificial Intelligence and Engineering Design, Vol. 144, Issue 2, 2021.

P. Velivela, N. Letov, Y. Liu, and Y.F. Zhao. “Application of Domain Integrated Design Methodology for Bio-inspired Design – A Case Study of Suture Pin Design,” 23rd International Conference of Engineering Design, Gothenburg, Sweden, August 16-20, 2021.

M. Sage and Y.F. Zhao. “Is Machine Learning suitable to improve my process? -- A guide to assess the applicability of machine learning algorithms in the manufacturing industry,” 2021

Associate Invited Talks

Panangaden, Prakash

P. Panangaden. “From bisimulation to representation learning,” The Milner Lecture, University of Edinburgh, 30th, September 2021.

P. Panangaden. “Representation learning via metrics,” University of Bologna, June 2021.

P. Panangaden. “Distributional analysis of sampling-based RL algorithms,” Max Planck Institute, May 2021.

Precup, Doina

D. Precup. “Building AI Agents With Reinforcement Learning,” 34th Canadian Conference on Artificial Intelligence, May 2021.

Fiona, Yaoyao Zhao

Y.F. Zhao. “Design for Additive Manufacturing – from pure complexity to multi-functionality,” Invited department seminar at Mechanical Engineering Department in University of Connecticut, October 15, 2021

Y.F. Zhao. “Design for Additive Manufacturing – from pure complexity to multi-functionality,” Invited seminar at Xerox PARC (Palo Alto Research Center), October 26, 2021.

Y.F. Zhao. “Opportunities and Challenges in Design for Additive Manufacturing: From Lattice Structures to Multi-functionalities,” Invited keynote in the Symposium on Design, Modeling, and Simulation Methodologies and Concepts for AM at the ASTM International Conference on Additive Manufacturing (ASTM ICAM 2021), November 1-5, 2021 in Anaheim, CA, USA.

Y.F. Zhao. “A Novel Solidification Microstructure Simulation Method for Metal Additive Manufacturing,” Invited keynote in 14th Pacific Rim Conference on Ceramic and Glass Technology, December 13-16, 2021, Vancouver, BC, Canada.

Associate Funding

Grant	Total Funding	2021 Amount
MITACS	$440,000	$177,500
NSERC	$7,007,707	$1,708,238
Other Federal	$3,570,598	$725,876
Industry/Other	$2,753,395	$757,995
Total	$13,771,701	$3,369,610

Centre for Intelligent Machines
McGill University
3480 University Street
Montreal, Quebec
H3A 0E9