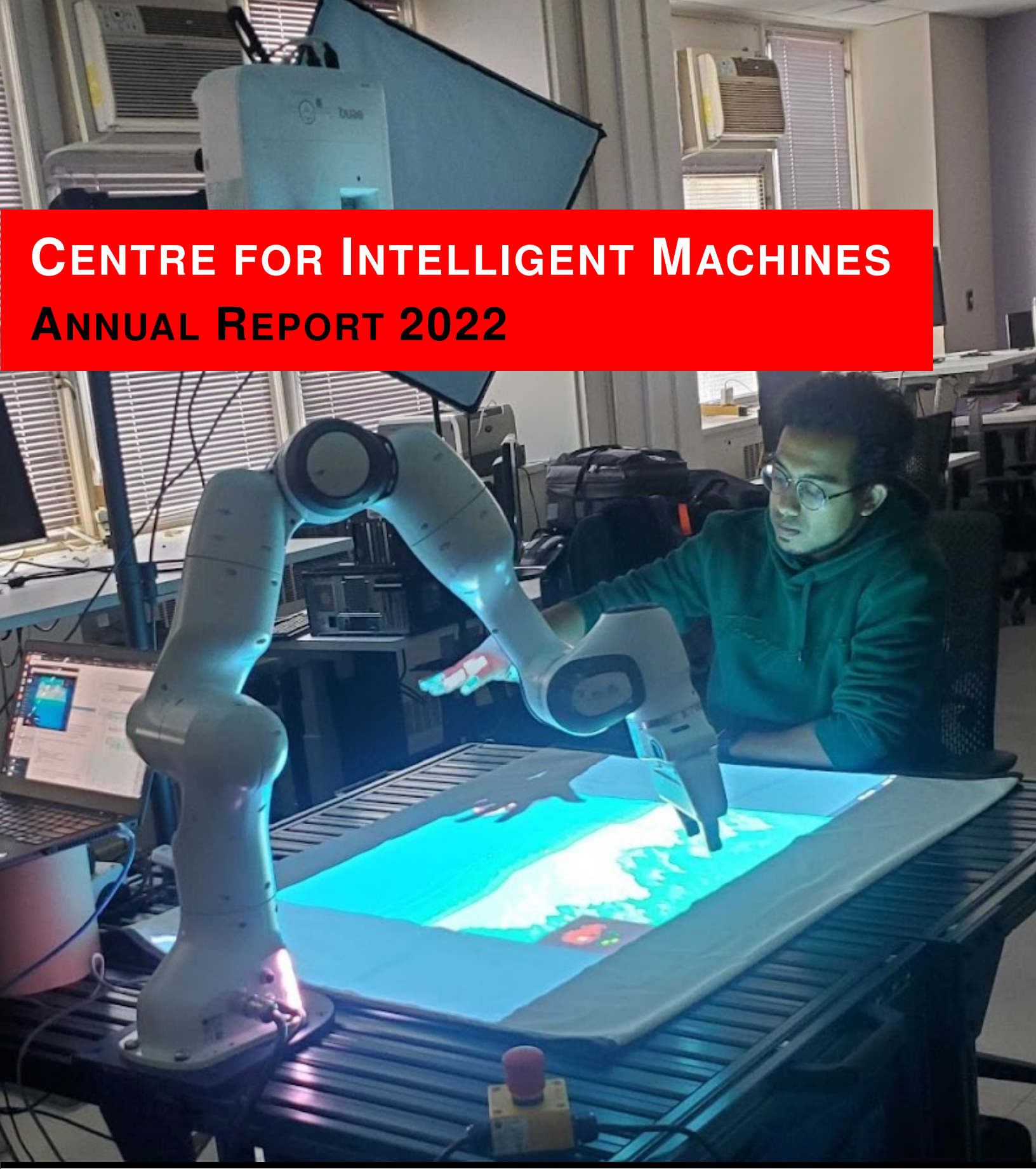


Centre for Intelligent Machines

Annual Report 2022

CIM CENTRE FOR INTELLIGENT MACHINES

DIRECTOR'S COMMENTS

I am happy to report on the first year post-COVID that most of us would classify as "normal": CIM events resumed and the increase in energy levels in the hallways of the campus and the centre are palatable. Unsurprisingly, the CIM community — which I'm happy to note has grown in new and exciting ways, and will continue to do so in 2023/2024 — has continued its legacy of contributing to a diversity of academic communities.

This past year saw the official retirement of our long-standing head of IT, Jan Binder, and the welcome onboarding of our new IT lead — Dr. Olivier St.-Martin Cormier. Nick has also returned full-time and, together, they have undertaken an impressively large number of projects. We will continue to build upon this momentum, revamping IT services at CIM to better reflect the growing needs of our members and their groups, this year.

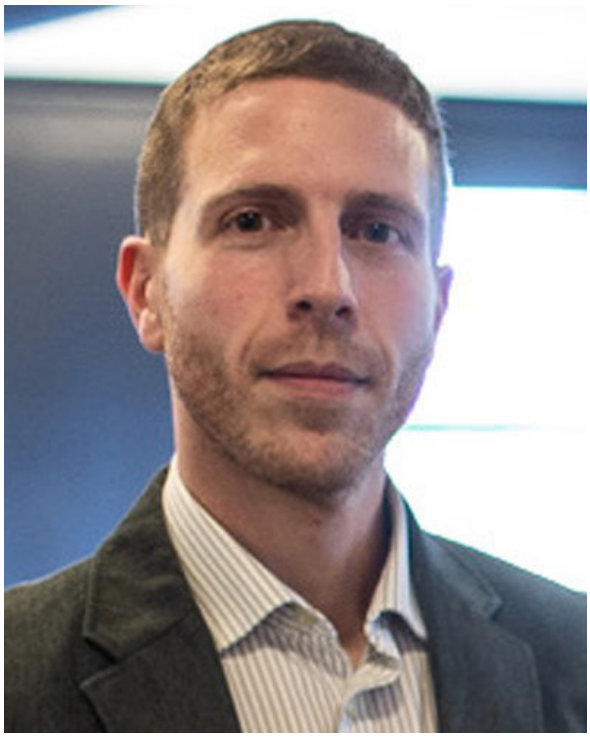
It was again touching to see CIM members supporting each other both professionally and socially through the transitions we've lived since COVID and I am excited — now, arguably, more than ever — at what opportunities will come our way in the coming year. Shortly, we will welcome Chelsea back from her maternity leave, returning our staffing capacity to its pre-COVID state (and beyond!) The Centre sends its sincere appreciation and thanks to our Manager, Marlene Gray, for her tireless efforts over these past challenging years.

As with previous years, we are accruing a growing list of candidates for new Associate and Full membership at CIM. These members will bolster our existing strengths, while also diversifying CIM's footprint. This is fitting given the growing need for applications of CIM-centered expertise in technical, business and societal arenas. CIM's Industrial Liaison Program will likely onboard a couple new industrial members, and we will integrate the membership more deeply in these undertakings (and the fruits of their establishment).

On a more somber note, the CIM community was deeply saddened to lose one of its most influential members, Dr. Vincent Hayward, earlier this year. His impact, both academically, scientifically and to the multiple of members and students he supported and touched, cannot be described in words. This year's annual report includes a memorial is his honour, albeit one that — by construction — cannot fully capture the depth of his impact on us and on the world.

Finally, I wish to express my deepest thanks to the entirety of the growing CIM community, and I very much look forward to seeing you all on campus in the Fall.

Sincerely,
Derek Nowrouzezahrai
Director of CIM



Centre Governance

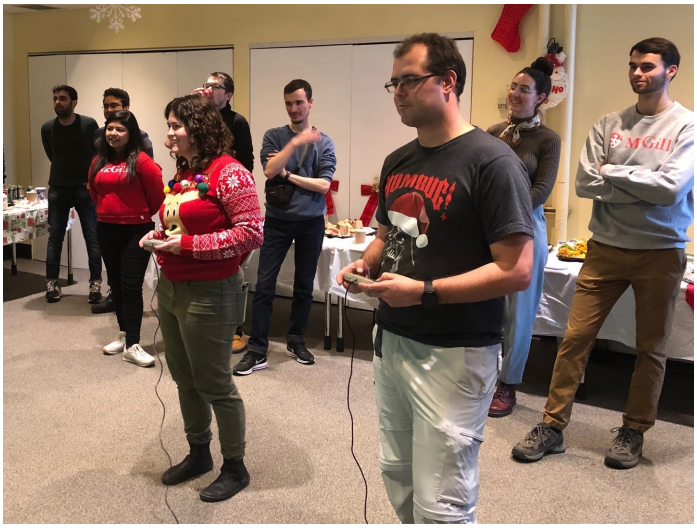
Day-to-day operation of the Centre's activities, management of its finances, allocation of space and other resources, are carried out by the Centre's Director, assisted by the Manager and IT staff. The Centre is advised by the Centre's Board, which meets yearly to review the Centre's activities and budget, and to provide guidance on strategic planning.

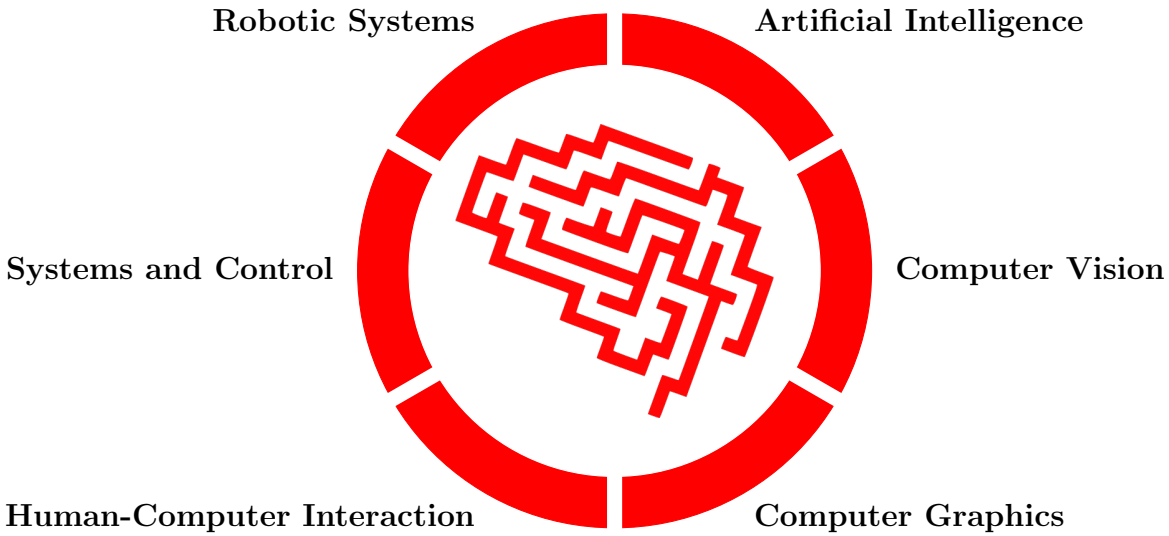
> Board of Governance

- **Derek Nowrouzezahrai** —
  Centre Director, Board Chair
- **Vivienne Mongeau** —
  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

> CIM Staff

- **Marlene Gray** —
  CIM Manager
- **Olivier St-Martin Cormier** —
  Systems Manager
- **Nick Wilson** —
  Systems Administrator
- **Chelsea Rogers** —
  Communications Associate (on leave)
- **Jan Binder** —
  Systems Manager (on leave)





OVERVIEW OF CENTRE

> MISSION

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.

> CORE RESEARCH

Intelligent systems 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 graphics and machine and reinforcement learning.

MEMBERS

The center consists of 27 full members and 16 associate members

> FULL MEMBERS

BOULET, BENOIT

Professor
Electrical and Computer Engineering
Systems and Control

ANGELES, JORGE

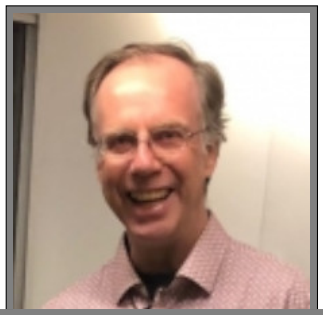
Emeritus Professor
Mechanical Engineering
Robotics and Mechanisms

CAINES, PETER EDWIN

Distinguished James McGill Professor
Electrical and Computer Engineering
Systems and Control

ARBEL, TAL

Professor
Electrical and Computer Engineering
Computer Vision & Medical Image Analysis



CLARK, JAMES J

Professor
Electrical and Computer Engineering
Computer Vision

COOPERSTOCK, JEREMY

Professor
Electrical and Computer Engineering
Human-Computer Interaction

FORBES, JAMES RICHARD

Associate Professor
Mechanical Engineering
Dynamics and Control

DUDEK, GREGORY

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

GROSS, WARREN

Professor
Electrical and Computer Engineering
Integrated Circuits and Systems

FERRIE, FRANK P

Emeritus Professor
Electrical and Computer Engineering
Computer Vision

KOVECSES, JOZSEF

Professor
Mechanical Engineering
Robotics and Aerospace Systems

KRY, PAUL

Associate Professor
School of Computer Science
Computer Graphics

LIN, HSIU-CHIN

Assistant Professor
School of Computer Science / ECSE
Robotics and Machine Learning

LANGER, MICHAEL

Associate Professor
School of Computer Science
Computer Vision

MAHAJAN, ADITYA

Associate Professor
Electrical and Computer Engineering
Systems and Control

LEVINE, MARTIN D

Emeritus Professor
Electrical and Computer Engineering
Computer Vision

MEGER, DAVID

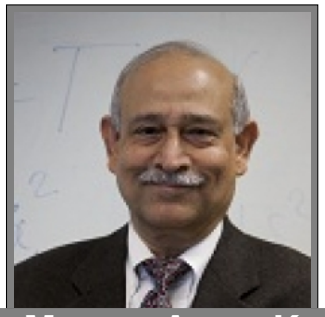
Associate Professor
School of Computer Science
Robotics and Computer Vision

MICHALSKA, HANNAH

Associate Professor
Electrical and Computer Engineering
Systems and Control

NAHON, MEYER

Professor
Mechanical Engineering
Robotics



MISRA, ARUN K

Professor
Mechanical Engineering
Dynamics and Control

NOWROUZEZAHRAI, DEREK

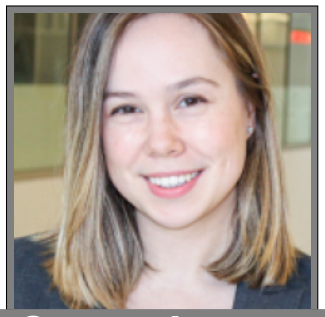
Associate Professor
Electrical and Computer Engineering
Computer Graphics and Artificial Intelligence

MOON, AJUNG

Assistant Professor
Electrical and Computer Engineering
Robotics

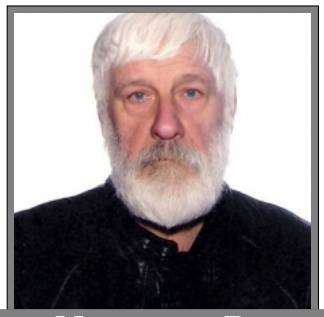
PINEAU, JOELLE

Professor, William Dawson Scholar
Computer Science
Robotics and Machine Learning



SEDAL, AUDREY

Assistant Professor
Mechanical Engineering
Robotics



ZSOMBOR-MURRAY, PAUL JOSEPH

Associate Professor
Mechanical Engineering
Robotics

SHARF, INNA

Professor
Mechanical Engineering
Robotics

SIDDIQI, KALEEM

Professor
School of Computer Science
Computer Vision

> ASSOCIATE MEMBERS

- **Adamchuk, Viacheslav** —
  Associate Professor
  Bioresource Engineering
- **Armandfard, Narges** —
  Assistant Professor
  Electrical & Computer Engineering
- **Cecere, Renzo** —
  Associate Professor
  Cardiac Surgery (RVH)
- **Cheung, Jackie Chi Kit** —
  Assistant Professor
  School of Computer Science
- **Collins, Louis** —
  Professor
  Biomedical Engineering
- **Dimitrakopoulos, Roussos** —
  Professor
  Mining Engineering
- **Hamann, Marco** —
  Professor
  Dresden University of Applied Sciences
- **Hayward, Vincent (see in memorium)** —
  Professor
  ISIR, Université Pierre et Marie Curie, Paris France
- **Husty, Manfred** —
  Professor
  University of Innsbruck, Austria
- **Liu, Xue** —
  Associate Professor
  School of Computer Science
- **Mongrain, Rosaire** —
  Professor & Chair
  Mechanical Engineering
- **Panangaden, Prakash** —
  Professor
  School of Computer Science
- **Pike, Bruce** —
  Professor
  Faculty of Medicine, University of Calgary
- **Precup, Doina** —
  Associate Professor
  School of Computer Science
- **Sun, Lijun** —
  Associate Professor
  Civil Engineering
- **Zhao, Yaoyao Fiona** —
  Associate Professor
  Mechanical Engineering

126 PhD Students, 22 Post-doctoral Fellows

115 Undergraduate Students, 115 Master's Students

> STUDENTS

The Centre's members occasionally take time out to relax and connect with their fellow researchers and graduate students. This interaction is aided by the mixing of different research groups in the labs and offices, and by the presence of the CIM lounge.

CIM has always offered a wealth of activities for its students and staff, including scientific workshops, lab visits, team building events and many seminars.

With COVID restrictions finally lifted, CIM ended the year 2022 on a high note. An Orientation Session for students was held in November that included pizza and posters. Students and faculty embraced the opportunity to mix and mingle again with colleagues and friends, not to mention present their posters and indulge in plenty of pizza.

Throughout the winter months some of the robotic labs held tours for their industrial partners. On May 23, 2023, the CIM-REPARTI groups headed to Université Laval to participate in the first in-person REPARTI Scientific Workshop since 2019. The event was a huge success and a strong sense of collaboration prevailed with other partners in REPARTI, such as Université Laval, ÉTS, Université Sherbrooke, Université de Montréal, and École Polytechnique. The guest speaker was Dr. Benoit Gosselin, PhD, ing., Fellow CAE, Canada Research Chair in Smart Biomedical Microsystems, Department of Electrical and Computer Engineering at Université Laval. The title of this talk was *AI-enabled sensors for advanced neuroengineering and personalized healthcare applications.*

IN MEMORIUM - VINCENT HAYWARD

Our community was deeply saddened to receive the news of Vincent Hayward's passing on May 10, 2023. Vincent was a founding member and former Director of CIM.

Vincent was deeply curious and imaginative, and a truly unique contributor to the various academic communities he engaged with. His passion for robotics and haptics was palpable in the many (happily crowded!) labs he shared with — at times — upwards of six world renowned roboticists on CIM's McConnell 4th floor spaces. Among his many noteworthy achievements, he was the primary supervisor of Canadian Astronaut Julie Payette early on in his career, when she pursued her postdoctoral studies at McGill, mentoring her through her work on the Canada Space Arm NASA endeavour. When the STS-96 Shuttle Discovery launched on May 27, 1999 — with Julie serving as a mission specialist — CIM's homemade flag representing McGill was flown on the mission and stamped officially while in orbit. Julie handed over the flag to then Principal Bernard Shapiro in a large ceremony that included a uniquely diverse crowd of both international dignitaries and McGill students.

Vincent's more legendary status grew from within his CIM lab space. He will always be remembered as one of the forefather's of haptics and tactile perception in Canada and internationally. In 2003 the Canadian Institute for the Blind presented Vincent with the prestigious E. (Ben) and Mary Hochhausen Award for his efforts in developing an affordable, computer driven braille display. In addition to his many academic accolades, Vincent was an astute business person, forming a spin-off company — Haptec, in 1995 — which was later acquired by Immersion. He continued to play an important role in developing Immersion and driving its success in Canada. Similarly, he was instrumental in attracting RICOH to Canada and to CIM. Arguably his greatest industrial success was the formation and co-founding of Actronik SAS in France.

There are many loving sentiments that have been communicated from across the world, and — closer to home — from CIM members past and present, who enjoyed Vincent's collegial nature and infectious curiosity. The respect our members share for him as a scientist is seemingly boundless. Vincent embraced music, the arts and philosophy, and took uncharacteristic risks in accepting students from these disciplines (much more so at the time, but even by today's standards): indeed, he saw great potential and opportunity where others did not, basked in the challenges of teaching, and held an open door policy to anyone who wanted to visit and share knowledge in his lab.

Vincent's loss has had a profound impact on the global haptics community, as it had on our local CIM community — he will be greatly missed, but his contributions (and our memories of living alongside them) will never fade.

AWARDS AND HONORABLE MENTIONS

LIN, HSIU-CHIN

Peter Sylvestri Research Award from Faculty of Engineering – CIM member Hsiu-Chin Lin won the Peter Sylvestri Research Award in the Faculty of Engineering.

NOWROUZEZAHRAI, DEREK

Canada CIFAR AI Chair (MILA) – CIM member and Director, Derek Nowrouzezahrai, was awarded the prestigious CIFAR in AI Chair (MILA). Derek is an Associate Professor at McGill University and a core member of the Quebec Institute for Artificial Intelligence (Mila). Derek's group, the McGill Graphics Lab, located in the Centre for Intelligent Machines, works on devising new mathematical models of visual phenomena and dynamics, developing efficient and differentiable numerical approaches to solve forward and inverse problems in complex physics-based regimes. These include problems in light transport, fluid dynamics and control, reinforcement and representation learning, robotics, augmented reality, digital manufacturing, computational optics and imaging, and image and geometry processing. His work has been adopted in feature films, video games, autonomous vehicles, amusement parks and consumer products.

PRECUP, DOINA

Canada CIFAR AI Chair (MILA) – research lead at DeepMind in Montreal Mila Core Academic Member—named Fellow of the Royal Society of Canada for her fundamental contributions to reinforcement learning and her contributions to the use of machine learning (ML) in medicine that have made a difference in practice

SIDDIQI, KALEEM

Co-Chair in AI and the Brain (MUHC - FRQS) – CIM member Kaleem Siddiqi was awarded the FRQS Dual Chair in AI and the Brain with Keith Murai from the RI-MUHC. They have been particularly interested in developing new AI and computer vision approaches to detect subtle changes to neuronal and glial cellstructure, which cannot be easily identified by current pathological analysis. To strengthen the direct human health relevancy of this research, Drs Siddiqi and Murai are collaborating with Dr. Naguib Mechawar (Director of the Douglas-Bell Canada Brain Bank, Douglas Mental Health University Institute) to accelerate the development of technologies to investigate brain nanostructure in AD cortical samples. Research is supported by a CIHR Project Grant (Murai, PI), an IDRC-Israel Science Foundation grant (Murai, PI), and an FRQS bourse de forme.

CIFAR

Canadian Institute for Advanced Research

BRaIN Seminar Series

Brain Repair and Integrative Neuroscience Program

KNOWLEDGE TRANSFER

> INVITED SPEAKERS

A vigourous exchange of ideas is the lifeblood of any active research Centre. Spearheaded by the long-running Informal Systems Seminar series, the Centre regularly hosts talks by eminent scholars from around the world.

- "Capteurs pilotés par l'IA pour la neuro-ingénierie et les soins de santé personnalisés", Benoit Gosselin, PhD, ing., Fellow ACG, Chaire de recherche du Canada en microsystèmes biomédicaux Département de génie électrique et de génie informatique Université Laval, May 23, 2022
- "Multiple Solutions of Direct Kinematics of 3-RPR Parallel Manipulators", Manfred L. Husty, Ph.d., Professor, University of Innsbruck, Austria, May 24, 2022
- "Non-Cooperative Matrix Games with Interval Payoffs", G. Selin Savaşkan – Çanakkale Onsekiz Mart University, Turkey, June 2, 2022
- "Cooperative Interval Games and their Potential on Economics and Operations Research Situations", Sırma Zeynep Alparslan Gök – Suleyman Demirel University, Turkey, June 9, 2022
- "Ruslan Goyenko, Associate Professor, Finance at Desautels Faculty of Management, McGill University, ", Ruslan Goyenko, Associate Professor, Finance at Desautels Faculty of Management, McGill University, , June 17, 2022
- "Geometric Deep Learning", Petar Veličković, Staff Research Scientist, DeepMind, London, UK, August 05, 2022
- "Convex Optimization of Bioprocesses", Josh Taylor, Associate Professor, Electrical and Computer Engineering, University of Toronto, Canada, September 22, 2022
- "An Eikonal Equation with Vanishing Lagrangian Arising in Global Optimization", Martino Bardi – University of Padova, Italy, September 29, 2022
- "Optimal Design of Renewable Energy Certificate markets: A Principal-Agent Mean Field Game Approach", Dena Firoozi – Assistant Professor, Department of Decision Sciences, HEC Montréal, Canada, October 6, 2022
- "Submodular Mean Field Games: From Examples to a General Formulation", Jodi Dianetti and Max Nendel, Center for Mathematical Economics, Bielefeld University, Germany, October 07, 2022
- "A Stationary Mean-Field Equilibrium Model of Irreversible Investment in a Two-State Economy", Giorgio Ferrari, Professor, Center for Mathematical Economics, Bielefeld University, Germany, October 14, 2022
- "Environmental and Economic Consequences of a Market with Green and Brown Firms", Francisco Cabo – Universidad de Valladolid, Spain , October 20, 2022
- "Transmission Neural Networks: From Virus Spread Models to Neural Networks", Shuang Gao, Research Fellow, Simons Institute, UC Berkeley, USA, October 21, 2022
- "Convergence of Empirical Measures, Mean-Field Games and Deep Learning Algorithms", Ruimeng Hu, Assistant Professor, Department of Mathematics, and Department of Applied Probability and Statistics, University of California, Santa Barbara, USA, October 28, 2022
- "A Distributed Algorithm for Wasserstein Proximal Operator Splitting: Theory & Applications", Abhishek Halder, Assistant Professor, Department of Applied Mathematics, University of California at Santa Cruz, November 4, 2022

- "Characterisation of Stochastic Geometry in Microscopy", Jon Sporring, Ph.d., Professor, Department of Computer Science, University of Copenhagen, Denmark, November 4, 2022
- "A Mean Field Game Description of Pedestrian Dynamic", Denis Ullmo, Senior Research Scientist, Paris-Saclay Institut Pascal, Université Paris-Saclay, Paris, France, November 11, 2022
- "Optimal stopping mean-field games: a linear programming formulation and applications to entry-exit games in electricity markets", Roxana Dimitrescu, Associate Professor, King's College London, November 11, 2022
- "Relaxations of the Best Response Algorithm in Ratio-Bounded Games", Francesco Caruso – Università Degli Studi Di Napoli Federico II, Italy , November 17, 2022
- "Adaptive Internal Models in Systems Neuroscience", Mireille E. Broucke, Professor, Department of Electrical and Computer Engineering, University of Toronto, Canada, November 18, 2022
- "On the Existence of Equilibrium in a Dynamic Supply Chain Game with Vertical Coordination, Horizontal Competition and Cournot Complementary Goods", Bertrand Crettez – Université Panthéon-Assas, Paris II, France, November 24, 2022
- "On the Interplay between Environmental CSR Practices and Emission Permits", Alessandro Tampieri – Università degli Studi di Firenze, Italy, December 1, 2022
- "Sensitivity-Based Design Methods Achieving Improved Control Performance", David Bensoussan, Professor, École de Technologie Supérieure, Canada, December 02, 2022
- "Regime Switching in Dynamic Games with Hyperbolic Discounting", Jorge Navas – Universitat de Barcelona, Spain, December 8, 2022
- "Control and Machine Learning", Enrique Zuazua, Professor, FAU- Friedrich–Alexander University, Erlangen–Nürnberg, Germany, December 16, 2022
- "Reinforcement Learning for Non-Markovian Environments", Vivek Borkar, Emeritus Faculty, Indian Institute of Technology Bombay, India, January 13, 2023
- "Modelling evolution in structured populations using multiplayer interactions", Mark Broom – City, University of London, United Kingdom, January 19, 2023

- "Equilibrium in Queueing System with Strategic Users", Vladimir Mazalov – Karelian Research Center, Russia, January 26, 2023
- "Decision Awareness in Reinforcement Learning", Pierre-Luc Bacon, Assistant professor, Department of Computer Science and Operations Research, Université de Montréal, February 10, 2023
- "Policy Revision Dynamics and Algorithm Design in Stochastic and Mean-Field Games", Bora Yongacoglu – Queen's University, February 15th, 2023
- "Asymptotic Behavior and Selection of Subgame Perfect Nash Equilibria in Stackelberg Games", Maria Carmela Ceparano – Università Degli Studi Di Napoli Federico II, Italy, February 16, 2023
- "Mean Field Limits of Heterogeneous Networks", Chuang Xu, Assistant Professor, Department of Mathematics, University of Hawaii at Mānoa, February 17, 2023
- "Cooperative Differential Games on Networks", Anna Tur – Saint Petersburg State University, Russia, February 23, 2023
- "Stackelberg Competition in Groundwater Resources with Multiple Uses", Julia de Frutos Cachorro – Universitat de Barcelona, Spain, March 2, 2023
- "A Potential Approach for One-Dimensional Price Formation Models", Julian Pineda, Ph.D. candidate, Applied Mathematics and Computational Sciences, King Abdullah University of Science and Technology, March 3, 2023
- "Learning with Augmented Reality in Maker Spaces", Dr. Iulian Radu, March 6, 2023
- "Graphon Dynamical Systems: A Law of Large Numbers, Large Deviations, and Applications", Georgi Medvedev, Professor, Department of Mathematics, Drexel University, March 10, 2023
- "The Role of Convexity in Data-Driven Decision-Making", Peyman Mohajerin Esfahani, Associate Professor, Delft Center for Systems and Control, TU Delft, March 24, 2023
- "Open-Loop Nash Equilibrium in Games with Time-Varying Delays", Dominika Machowska – Institute of Applied Mathematics and Mechanics, Warsaw University, Poland , March 23, 2023
- "Partial Centralization in a Durable-Good Supply Chain", Victor Shi – Lazaridis School of Business and Economics, Wilfrid Laurier University, Canada, April 6, 2023

FUEL FOR INNOVATION

> FUNDING SOURCES

The members of CIM are engaged as PI's and co-PI's in a wide range of provincial and federal agency funding as well as industrial partnerships.
Key funding to the Centre is provided by: Regroupement Stratégiques REPARTI (Cyberphysical Systems and Embedded Machine Intelligence) (April 2019 - March 2026)

The regroupement REPARTI provides invaluable support to CIM to help cover its operating costs.

Systèmes cyber-physiques et intelligence machine matérialisée (Cyberphysical Systems and Embedded Machine Intelligence) (April 2019 - March 2026) 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 $10M annually. This FQRNT 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
- 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:

1. 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.

2. 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.

3. The regroupement REPARTI has been renewed twice, in 2013 and 2019, to continue a long tradition of excellence in research. Regroupement REPARTI will be invited to renew as of 2026.

> CIM INDUSTRIAL LIAISON PROGRAM

The Centre accepts companies to it's Industrial Liaison Program and provides these companies with unique benefits. It is a dynamic way for them to keep up-to-date on the exciting research going on at the Centre and to be invited to CIM's Research Showcase Events.

It also provides it's members with access to students to facilitate recruiting purposes as well. More information is available about the ILP and it's tiered membership fees at:
`https://www.mcgill.ca/cim/partner`

> FUNDING PARTNERSHIPS

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

> PARTNERSHIPS

MILA

MILA Quebec AI Institute maintains strong links to our CIM members and the CIM community. Collaboratively and financially MILA's programs and collegial energy foster deep relationships with industrial and scientific partnership. There are currently four CIM members and associates holding CIFAR MILA Chairs in AI.

REPARTI

The regroupement REPARTI - Systèmes cyber-physiques et intelligence machine matérialisée (Cyberphysical Systems and Embedded Machine Intelligence) (April 2019 - March 2026) 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:

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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.

NSERC

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.

FQRNT

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 Stratégiques including GERAD and CIRMMT, which gather researchers from many institutions to further common research goals within certain thematic areas.

NCRN

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.

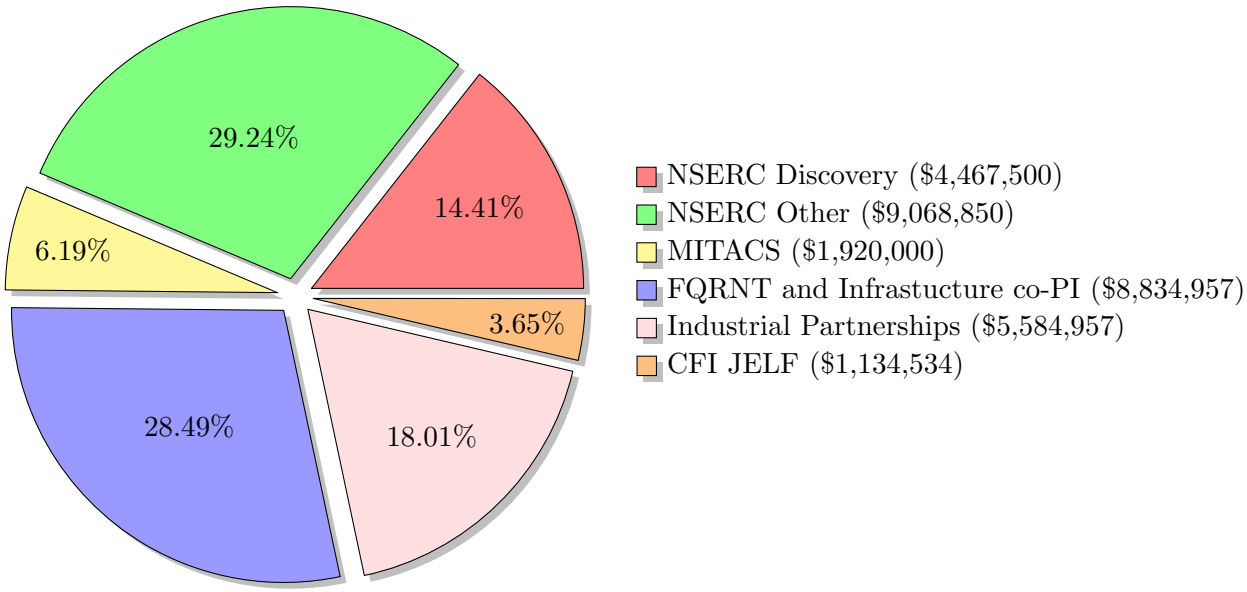
NCRN NSERC Canadian Robotics Network RCRC Réseau canadien de robotique du CRSNG

MITACS

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.

Mitacs

TOTAL VALUE OF GRANTS: $ 31,010,798



PUBLICATIONS

> INVITED LECTURERS

ARBEL, TAL

- Invited Panelist/speaker, Machine Learning in Neuroscience, 2022 Edition of the European Academy of Neurology (hybrid) Congress, Satellite Symposium, Machine Learning Personalized Medicine and Drug Discovery in Neuroscience, Vienna, Austria (virtually), June 2022. Honorarium of $1750 CAD.
- Invited speaker, Towards Causal, Explainable, Generalizable Deep Learning Models for Image-Based Personalized Medicine", TUM (Technical University of Munich) Distinguished Lecture Series on AI & Healthcare, Dec 2022.
- RSIP CVPR Daily Magazine, 2022 IEEE/CVF Computer Society Conference on Computer Vision and Pattern Recognition (CVPR), "Workshop on Medical Computer Vision Preview", April 2022, pp.46-48.
- RSIP Best of CVPR 2022, 2022 IEEE/CVF Computer Society Conference on Computer Vision and Pattern Recognition (CVPR) "Workshop on Medical Computer Vision", pp. 36-39.

CAINES, PETER

- Opening Speaker: Conference on Mathematics and Financial Economics, "Many Player Games and Applications", Humbolt University, Berlin, 29 - 31 August 2022
- Speaker: Graph Limits, Nonparametric Models, and Estimation Workshop, Simons Institute for the Theory of Computation, UCB, Berkeley, CA, 26-30 ,September, 2022
- Opening Speaker: Workshop on Mean Field Games, Montreal: Centre de Recherches Mathématiques (CRM) , 11-15 April, 2022

CLARK, JAMES

- "Neural Network Compression for Mobile Devices: Accuracy, Calibration and Adaptation", invited presentation at Huawei Strategy and Technology Workshop (STW-2022), Shenzhen China, September 2022.
- "What is Lost During Network Compression?", invited presentation at 2022 Edge Intelligence Workshop, Montreal, September 2022.
- "The McGill Retail Innovation Lab", invited presentation at Le Rendez-vous IA Quebec, Quebec City, April 2022.

COOPERSTOCK, JEREMY

- Speaker in "Next Gen Health Powered By The Open Grid And Edge AI", IEEE Future Networks Forum, Montreal, October 14, 2022.

FORBES, JAMES RICHARD

- Expert speaker on "State Estimation for Robotics", 2022 Montreal Robotics Summer School, August 22-25, 2022.
- "Learning Robot Dynamics with the Koopman Operator," IVADO's Young Talent Development Program, Mila, October 21, 2022. Best presentation in the "Algorithms of Tomorrow" session.
- "Regularization Techniques in Koopman-based System Identification," Applied Mathematics Seminars, McGill University, September 12, 2022.
- "Model Predictive Control of a Tandem-rotor Helicopter," Dept. Electronics and Computer Science, University of Southampton, June 1, 2022.

- "Regularization Techniques in Koopman-based System Identification," Dept. Engineering Science, University of Oxford, May 30, 2022.
- "Model Predictive Control of a Tandem-rotor Helicopter," Optimization Days 2022, HEC Montreal, May 16-18, 2022.
- "System Norm Regularization Methods for Koopman Operator Approximation," Optimization Days 2022, HEC Montreal, May 16-18, 2022.
- "Regularization Techniques in Koopman-based System Identification," Ingenuity Labs Research Institute Lecture Series, Queen's University, April 20, 2022.

GROSS, WARREN

- "The Contributions of Frank R. Kschischang: A restrospective on his 60th birthday", University of Toronto, Toronto, October 14, 2022.
- "Polar Coding: Algorithms and Hardware", Ciena Corporation, Virtual seminar, November 9, 2022.
- "High Throughput Decoding with GRAND", International Symposium on Topics in Coding (ISTC) Workshop 2022, Montreal, QC, August 30, 2022.
- "On-Device Learning for Natural Language Processing with BERT", TinyML On Device Learning Forum, Virtual conference, August 31, 2022.
- "Edge Intelligence: On-Device Training For Natural Language Processing with BERT", Accelerating AI Workshop 2022, Virtual talk, May 4, 2022.

KOVECSES, JOZSEF

- "Task-Driven Dynamics and Modelling of Mechanical and Mechatronic Systems", presented at the Czech Technical University, Prague, Czech Republic, November 24, 2022.
- "Task and Information Driven Dynamics and Modelling for Robotic and Vehicle Systems", presented at the University of Debrecen, Debrecen, Hungary, May 31, 2022.

KRY, PAUL

- "Real-time physics simulation and the use of adaptive simulation", Huawei STW 2022, Shenzhen China & Online, invited speaker, 27 September, 2022
- "Physics-based computer animation and its applications for virtual humans", Huawei Workshop on Distributed Rendering and Simulation for Digital Humans, Markham, Ontario, invited speaker, 25 November 2022
- "Advice on Writing and Style for Computer Science Students", SOCS Colloquium, Invited Speaker, 28 October 2022
- "Writing Papers that People Can Read", FoieGraph, University of Montreal, Invited Speaker, 12 November 2022

LIN, HSIU-CHIN

- "Planning and Optimal Control for Robotics", Mila Robotics Summer School, Aug 22-25, 2022
- "Safe and Stable Motion Planning", Seoul National University, Dec 2, 2022
- "Safe and Stable Motion Planning", National Taiwan University, Dec 15, 2022

MAHAJAN, ADITYA

- "Approximate Planning and Learning for Partially Observed Systems", Texas A&M, College Station, TX, Oct 2022
- "A modified Thompson sampling-based learning algorithm for unknown linear systems", IEEE Conference of Decision and Control, Dec 2022

NOWROUZEZAHRAI, DEREK

- "Differentiable Physics: computer graphics as an inductive bias", Invited as Headline Keynote at the 2022 Montreal ACM SIGGRAPH Industrial Outreach Annual Symposium. Autodesk Montreal. December 2022.
- "Life in and out of Academia: retrospective and moving forward", Invited as Headline Keynote at the Fifth Annual Eastern Graphics Symposium (Foiegraph). University of Montreal. November 2022.
- Invited Panelist at Activision Creative Research Summit. December 2022.

MOON, AJUNG

- "Designing Interactive Robots with Ethics in Mind", UWaterloo MME Departmental Seminar Series, Waterloo, Canada. August 2022
- "Finding Value in AI Ethics", Microsoft Research Montreal Seminar Series, Montreal, Canada. August 2022

PINEAU, JOELLE

- Panel moderator. Is Human-lead mathematics over? with Fields Medal winner Timothy Gowers and Turing award winner Yann LeCun. FLAIM
- Panel guest. Fantasy and Fact: AI, Sentience and the Dangers of Hype. World AI Summit. Amsterdam.
- Panel guest. What role is big tech playing in shaping the metaverse? World AI Summit. Amsterdam.
- Keynote talk. New Research and Trends in AI. Autonomy through Cyberjustice Technologies (ACT) International Midterm Conference. Montreal.
- Keynote talk. Future of ML:The road not taken. Machine Learning Department 25th Anniversary. Carnegie Mellon University. Pittsburgh.
- Invited talk. AI research and the metaverse. Youth AI Lab. Virtual.
- Panel guest. Unlocking the potential at the crossroads of natural and artificial intelligence. Harvard Kempner Institute Celebration. Boston.
- Fireside chat guest. How AI breakthroughs will power the metaverse. Elevate Festival. Toronto.
- Panel guest. Responsible AI. Montreal AI Symposium. Montreal.
- Invited talk. Reproducibility in Reinforcement Learning. NextAI Incubator. Montreal.
- Panel guest. 40th anniversary panel. CIFAR. Toronto.
- Invited talk. Beyond Benchmarking: Towards reproducible research. ICRA Workshop on Releasing Robots in the Wild. Philadelphia.
- Panel guest. Women Beyond: Build for the Future. Meta Canada event.
- Keynote Talk. Improving Reproducibility in Machine Learning Research. Canadian Statistical Sciences Institute (CANSSI) workshop on Reproducibility.

PRECUP, DOINA

- "From Reinforcement Learning to AI", ICLR'2022 Keynote
- "On the need for systems know-how in large-scale machine learning and vice versa", DDMS Workshop, Keynote
- "What can hierarchical reinforcement learning do for you?" ICRA'2022 Workshop
- "On rewards in multi-agent systems". Simons Institute Multiagent RL Workshop

- "Introduction to reinforcement learning: exploration and model-based methods". Mediterranean Machine Learning summer school
- "Never-ending reinforcement learning". CIFAR Learning in Machines and Brains meeting (contributed)
- "Reinforcement learning and the future of AI", World Summit on AI 2022
- "Can reinforcement learning lead to general artificial intelligence?" TimeWorld conference, Univ. De Montreal
- "From Biological to Artificial intelligence". McGill Mini Science, 2022 (plenary/invited)

SHARF, INNA

- "Space Debris Removal: Technologies, Mission and Science", Utah Robotics Seminar, University of Utah, invited talk, virtual, September 15, 2022.
- "Space Debris Removal: Technologies, Mission and Science", AstroMcGill/Physics Matters Public Lecture, Montreal, invited talk, virtual, April 28, 2022.

SIDDIQI, KALEEM

- "Eqr: Equivariant Representations for data-efficient reinforcement learning", Presented by Arnab Mondal at the International Conference on Machine Learning (ICML), Baltimore, July, 2022.
- "Medial spectral coordinates for 3D shape analysis", Presented by Morteza Rezanejad as a talk at the International Conference on Computer Vision and Pattern Recognition (CVPR), New Orleans, June, 2022.
- "Finger-STS: Combined Proximity and Tactile Sensing for Robotic Manipulation", Presented by François Hogan at the International Conference on Robots and Systems (IROS). Kyoto, October,

> PUBLISHED PAPERS

ARBEL, TAL

[1] Brennan Nichyporuk et al. "Rethinking Generalization: The Impact of Annotation Style on Medical Image Segmentation". In: *The Journal of Machine Learning for Biomedical Imaging* (2022).

[2] Jean-Pierre R Falet et al. "Estimating individual treatment effect on disability progression in multiple sclerosis using deep learning". In: *Nature Communications* 13.1 (2022), pp. 1–12.

[3] Raghav Mehta et al. "QU-BraTS: MICCAI BraTS 2020 Challenge on Quantifying Uncertainty in Brain Tumor Segmentation-Analysis of Ranking Scores and Benchmarking Results". In: *Journal of Machine Learning for Biomedical Imaging* 1 (2022).

[4] Raghav Mehta et al. "Propagating uncertainty across cascaded medical imaging tasks for improved deep learning inference". In: *IEEE Transactions on Medical Imaging* 41.2 (2021), pp. 360–373.

[5] Changjian Shui et al. "On learning fairness and accuracy on multiple subgroups". In: *Advances in Neural Information Processing Systems* 35 (2022), pp. 34121–34135.

[6] Raghav Mehta et al. "Information Gain Sampling for Active Learning in Medical Image Classification". In: *Uncertainty for Safe Utilization of Machine Learning in Medical Imaging: 4th International Workshop, UNSURE 2022, Held in Conjunction with MICCAI 2022, Singapore, September 18, 2022, Proceedings*. 2022, pp. 135–145.

[7] Chelsea Myers-Colet et al. "Heatmap Regression for Lesion Detection Using Pointwise Annotations". In: *Medical Image Learning with Limited and Noisy Data: First International Workshop, MILLanD 2022, Held in Conjunction with MICCAI 2022, Singapore, September 22, 2022, Proceedings*. 2022, pp. 3–12.

[8] Amar Kumar et al. "Counterfactual image synthesis for discovery of personalized predictive image markers". In: *Artificial Intelligence over Infrared Images for Medical Applications and Medical Image Assisted Biomarker Discovery: First MICCAI Workshop, AIIIMA 2022, and First MICCAI Workshop, MIABID 2022, Held in Conjunction with MICCAI 2022, Singapore, September 18 and 22, 2022, Proceedings*. 2022, pp. 113–124.

[9] Joshua Durso-Finley et al. "Personalized prediction of future lesion activity and treatment effect in multiple sclerosis from baseline MRI". In: *International Conference on Medical Imaging with Deep Learning*. 2022, pp. 387–406.

[10] Julien Schroeter et al. "Segmentation-Consistent Probabilistic Lesion Counting". In: *International Conference on Medical Imaging with Deep Learning*. 2022, pp. 1034–1056.

[11] Anjun Hu et al. "Clinically Plausible Pathology-Anatomy Disentanglement in Patient Brain MRI with Structured Variational Priors". In: *Machine Learning for Health Symposium (ML4H 2022)* (2022).

[12] Anjun Hu et al. "Structured Priors for Disentangling Pathology and Anatomy in Patient Brain MRI". In: *Medical Imaging Meets NeurIpS* (2022).

[13] Annika Reinke et al. "Metrics Reloaded-A new recommendation framework for biomedical image analysis validation". In: *Medical Imaging with Deep Learning*. 2022.

BOULET, BENOIT

[14] Marc-Antoine Beaudoin and Benoit Boulet. "Learning-based synthesis of robust linear time-invariant controllers". In: *IEEE Transactions on Intelligent Vehicles* (2022).

[15] Marc-Antoine Beaudoin and Benoit Boulet. "Improving gearshift controllers for electric vehicles with reinforcement learning". In: *Mechanism and Machine Theory* 169 (2022), p. 104654.

[16] Marc-Antoine Beaudoin and Benoit Boulet. "Structured learning of safety guarantees for the control of uncertain dynamical systems". In: *IEEE Transactions on Intelligent Vehicles* (2022).

[17] Huiliang Zhang et al. "Building energy management with reinforcement learning and model predictive control: A survey". In: *IEEE Access* 10 (2022), pp. 27853–27862.

[18] Mostafa Darabi et al. "Closed-loop thickness control and sensor placement in extrusion blow moulding". In: *International Journal of Automation and Control* 16.5 (2022), pp. 621–648.

[19] Xijuan Sun et al. "Forecasting of Solar Energy Generation via Dynamic Model Ensemble". In: *2022 IEEE Electrical Power and Energy Conference (EPEC)*. 2022, pp. 109–115.

[20] Xijuan Sun et al. "Power System Anomaly Detection Via Ensemble of Encoder and Decoder Networks". In: *2022 IEEE Electrical Power and Energy Conference (EPEC)*. 2022, pp. 116–122.

[21] Jiuqi Elise Zhang, Di Wu, and Benoit Boulet. "Time Series Anomaly Detection via Reinforcement Learning-Based Model Selection". In: *2022 IEEE Canadian Conference on Electrical and Computer Engineering (CCECE)*. 2022, pp. 193–199.

[22] Yuwei Fu, Di Wu, and Benoit Boulet. "On the Benefits of Transfer Learning and Reinforcement Learning for Electric Short-term Load Forecasting". In: *2022 IEEE International Conferences on Internet of Things (iThings) and IEEE Green Computing & Communications (GreenCom) and IEEE Cyber, Physical & Social Computing (CPSCom) and IEEE Smart Data (SmartData) and IEEE Congress on Cybermatics (Cybermatics)*. 2022, pp. 195–203.

[23] Asal Zabetian-Hosseini, Geza Joos, and Benoit Boulet. "Centralized Control Design for Bidirectional DC Charging Stations to Enable V2G". In: *2022 IEEE/PES Transmission*

and Distribution Conference and Exposition (T&D). 2022, pp. 1–5.

[24] Yuwei Fu, Di Wu, and Benoit Boulet. "Reinforcement learning based dynamic model combination for time series forecasting". In: *Proceedings of the AAAI Conference on Artificial Intelligence*. Vol. 36. 6. 2022, pp. 6639–6647.

CAINES, PETER

[25] Peter E Caines et al. "On the graphon mean field game equations: Individual agent affine dynamics and mean field dependent performance functions". In: *ESAIM: Control, Optimisation and Calculus of Variations* 28 (2022), p. 24.

[26] Peter Caines et al. "Lattice conditional independence models and Hibi ideals". In: *Transactions of the London Mathematical Society* 9.1 (2022), pp. 1–19.

[27] Dena Firoozi, Ali Pakniyat, and Peter E Caines. "A class of hybrid LQG mean field games with state-invariant switching and stopping strategies". In: *Automatica* 141 (2022), p. 110244.

[28] Peter E Caines. "Embedded vertex-graphons and embedded GMFG systems". In: *2022 IEEE 61st Conference on Decision and Control (CDC)*. 2022, pp. 5550–5557.

[29] Borna Sayedana et al. "Consistency and Rate of Convergence of Switched Least Squares System Identification for Autonomous Markov Jump Linear Systems". In: *2022 IEEE 61st Conference on Decision and Control (CDC)*. 2022, pp. 6678–6685.

[30] Rinel Foguen-Tchuendom et al. "Optimal network location in infinite horizon LQG graphon mean field games". In: *2022 IEEE 61st Conference on Decision and Control (CDC)*. 2022, pp. 5558–5565.

[31] Joao Saude and Peter E Caines. "Markowitz Portfolio Optimization Extended Quadratic Mean-Field Games Approach". In: *2022 IEEE 61st Conference on Decision and Control (CDC)*. 2022, pp. 5523–5528.

[32] Borna Sayedana et al. "Thompson-Sampling Based Reinforcement Learning for Networked Control of Unknown Linear Systems". In: *2022 IEEE 61st Conference on Decision and Control (CDC)*. 2022, pp. 723–730.

[33] Alex Dunyak and Peter E Caines. "Linear Stochastic Graphon Systems with Q-Space Noise". In: *2022 IEEE 61st Conference on Decision and Control (CDC)*. 2022, pp. 3926–3932.

[34] Rinel Foguen Tchuendom, Shuang Gao, and Peter E Caines. "Stationary Cost Nodes in Infinite Horizon LQG-GMFGs". In: *IFAC-PapersOnLine* 55.30 (2022), pp. 284–289.

CLARK, JAMES

[35] Charles Le et al. "Efficient Two-Stage Progressive Quantization of BERT". In: *Proceedings of The Third Workshop on Simple and Efficient Natural Language Processing (SustaiNLP)*. 2022, pp. 1–9.

[36] Zahra Vaseqi et al. "A Framework for Video-Text Retrieval with Noisy Supervision". In: *Proceedings of the 2022 International Conference on Multimodal Interaction*. 2022, pp. 373–383.

[37] M Abdelgawad et al. "BERTPerf: Inference Latency Predictor for BERT on ARM big. LITTLE Multi-Core Processors". In: *2022 IEEE Workshop on Signal Processing Systems (SiPS)*. IEEE. 2022, pp. 1–6.

[38] Samrudhdhi B Rangrej, Chetan L Srinidhi, and James J Clark. "Consistency driven sequential transformers attention model for partially observable scenes". In: *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition*. 2022, pp. 2518–2527.

[39] Danilo Vucetic et al. "Efficient Fine-Tuning of Compressed Language Models with Learners". In: 2022.

[40] ML Kornelsen et al. "Fast Heterogeneous Task Mapping for Reducing Edge DNN Latency". In: *2022 IEEE 33rd International Conference on Application-specific Systems, Architectures and Processors (ASAP)*. IEEE. 2022, pp. 64–71.

[41] Farzaneh Askari et al. "Interaction Classification with Key Actor Detection in Multi-Person Sports Videos". In: *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition*. 2022, pp. 3580–3588.

[42] Lulan Shen et al. "Conjugate Adder Net (CAddNet)-a Space-Efficient Approximate CNN". In: *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition*. 2022, pp. 2793–2797.

[43] Ibtihel Amara et al. "CES-KD: Curriculum-based Expert Selection for Guided Knowledge Distillation". In: *2022 26th International Conference on Pattern Recognition (ICPR)*. IEEE. 2022, pp. 1901–1907.

[44] Negin Firouzian et al. "Work-in-Progress: Utilizing latency and accuracy predictors for efficient hardware-aware NAS". In: *2022 International Conference on Hardware/Software Codesign and System Synthesis (CODES+ ISSS)*. IEEE. 2022, pp. 15–16.

[45] Ali Edalati et al. "Kronecker decomposition for gpt compression". In: (2022).

[46] Hang Zhang et al. "Towards Finding Efficient Students Via Blockwise Neural Architecture Search and Knowledge Distillation". In: *Edge Intelligence Workshop, Montreal*. McGill University (Canada), 2022.

[47] Amir Ardakani et al. "Standard Deviation-Based Quantization for Deep Neural Networks". In: 2022.

[48] Ali Edalati et al. "Kronecker decomposition for gpt compression". In: *Edge Intelligence Workshop, Montreal*. 2022.

[49] Ziaeefard M. Meyer B. Gross W. Amara I. and J.J. Clark. "On the Importance of Integrating Curriculum Design for Teacher Assistant-based Knowledge Distillation". In: *Edge Intelligence Workshop, Montreal*. 2022.

[50] Mozafari S. Clark J.J. Gross W. Chang H-Y. and B. Meyer. "NAS plus Pipeline for High Throughput Edge Inference BERT". In: *Edge Intelligence Workshop, Montreal*. 2022.

[51] Mozafari S. Clark J.J. Meyer B. Kornelson M. and W. Gross. "ARMCL BERT: Novel Quantizable BERT Implementation for ARM SoCs". In: *Edge Intelligence Workshop, Montreal*. 2022.

[52] Mozafari S. Clark J.J. Gross W. Li C. and B. Meyer. "BERT Inference Energy Predictor for Efficient Hardware-aware NAS". In: *Edge Intelligence Workshop, Montreal*. 2022.

[53] Meyer B. Gross W. Shen L. and J.J. Clark. "Retention of Domain Adaptability in Compressed Neural Networks". In: *Edge Intelligence Workshop, Montreal*. 2022.

[54] Ardakani A. Clark J.J. Meyer B. Le C. and W. Gross. "Dyadic Integer Only BERT". In: *Edge Intelligence Workshop, Montreal*. 2022.

[55] Mozafari S. Clark J.J. Gross W.J. Firouzian N. and Meyer B.H. "Latency and Accuracy Predictors for Efficient BERT Hardware-aware NAS". In: *Edge Intelligence Workshop, Montreal*. 2022.

COOPERSTOCK, JEREMY

[56] Nathan Duarte et al. "Deploying wearable sensors for pandemic mitigation: A counterfactual modelling study of Canada's second COVID-19 wave". In: *PLOS Digital Health* 1.9 (2022), e0000100.

[57] Hyejin Lee et al. "The Sound of Hallucinations: Toward a more convincing emulation of internalized voices". In: *Proceedings of the 2022 CHI Conference on Human Factors in Computing Systems*. 2022, pp. 1–11.

[58] Juliette Regimbal, Jeffrey R Blum, and Jeremy R Cooperstock. "IMAGE: a deployment framework for creating multimodal experiences of web graphics". In: *Proceedings of the 19th International Web for All Conference*. 2022, pp. 1–5.

[59] Pascal E Fortin and Jeremy Cooperstock. "Understanding Smartphone Notifications' Activity Disruption via In Situ Wrist Motion Monitoring". In: *CHI Conference on Human Factors in Computing Systems Extended Abstracts*. 2022, pp. 1–6.

DUDEK, GREGORY

[60] Bobak H Baghi et al. "SESNO: Sample Efficient Social Navigation from Observation". In: *2022 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*. IEEE. 2022, pp. 9164–9171.

[61] Wei-Di Chang et al. "Il-flow: Imitation learning from observation using normalizing flows". In: *arXiv preprint arXiv:2205.09251* (2022).

[62] Xi Chen et al. "Fidora: Robust WiFi-based indoor localization via unsupervised domain adaptation". In: *IEEE Internet of Things Journal* 9.12 (2022), pp. 9872–9888.

[63] HU Chengming et al. *Communication load forecasting accuracy with adaptive feature boosting*. US Patent App. 17/570,767. 2022.

[64] Amal Feriani et al. "Multiobjective load balancing for multiband downlink cellular networks: A meta-reinforcement learning approach". In: *IEEE Journal on Selected Areas in Communications* 40.9 (2022), pp. 2614–2629.

[65] Johanna Hansen et al. "Visuotactile-rl: learning multimodal manipulation policies with deep reinforcement learning". In: *2022 International Conference on Robotics and Automation (ICRA)*. IEEE. 2022, pp. 8298–8304.

[66] Francois R Hogan et al. "Finger-sts: Combined proximity and tactile sensing for robotic manipulation". In: *IEEE Robotics and Automation Letters* 7.4 (2022), pp. 10865–10872.

[67] Chengming Hu et al. "Accurate Communication Traffic Forecasting with Multi-Source Adaptive Feature Boosting". In: *GLOBECOM 2022-2022 IEEE Global Communications Conference*. IEEE. 2022, pp. 2316–2321.

[68] Mostafa Hussien et al. "Efficient Neural Data Compression for Machine Type Communications via Knowledge Distillation". In: *GLOBECOM 2022-2022 IEEE Global Communications Conference*. IEEE. 2022, pp. 1169–1174.

[69] Jikun Kang et al. "A Generalized Load Balancing Policy With Multi-Teacher Reinforcement Learning". In: *GLOBECOM 2022-2022 IEEE Global Communications Conference*. IEEE. 2022, pp. 3096–3101.

[70] Hang Li et al. "Data-Efficient Communication Traffic Prediction With Deep Transfer Learning". In: *ICC 2022-IEEE International Conference on Communications*. IEEE. 2022, pp. 3190–3195.

[71] Hang Li et al. "Communication Traffic Prediction with Continual Knowledge Distillation". In: *ICC 2022-IEEE International Conference on Communications*. IEEE. 2022, pp. 5481–5486.

[72] Jimmy Li et al. "Traffic scenario clustering and load balancing with distilled reinforcement learning policies". In: *ICC 2022-IEEE International Conference on Communications*. IEEE. 2022, pp. 1536–1541.

[73] Manyou Ma et al. "Coordinated load balancing in mobile edge computing network: a multi-agent drl approach". In: *ICC 2022-IEEE International Conference on Communications*. IEEE. 2022, pp. 619–624.

[74] Sahand Rezaei-Shoshtari et al. "Hypernetworks for zero-shot transfer in reinforcement learning". In: *Proceedings of the AAAI Con-*

ference on Artificial Intelligence. Vol. 37. 8. 2023, pp. 9579–9587.

[75] Di Wu et al. "Active deep multi-task learning for forecasting short-term loads". In: *ICC 2022-IEEE International Conference on Communications*. IEEE. 2022, pp. 5523–5529.

[76] Di Wu et al. "Attentive Knowledge Transfer for Short-term Load Forecasting". In: *GLOBECOM 2022-2022 IEEE Global Communications Conference*. IEEE. 2022, pp. 5285–5291.

[77] Di Wu et al. "Short-term load forecasting with deep boosting transfer regression". In: *ICC 2022-IEEE International Conference on Communications*. IEEE. 2022, pp. 5530–5536.

[78] Hanging Zhao et al. "Behaviour Learning with Adaptive Motif Discovery and Interacting Multiple Model". In: *2022 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*. IEEE. 2022, pp. 10788–10794.

[79] Sandeep Manjanna, M Ani Hsieh, and Greogory Dudek. "Scalable multirobot planning for informed spatial sampling". In: *Autonomous Robots* 46.7 (2022), pp. 817–829.

FORBES, JAMES RICHARD

[80] Martin Doff-Sotta, Mark Cannon, and James Richard Forbes. "Spacecraft energy management using convex optimisation". In: *Energy Conversion and Management: X* 16 (2022), p. 100325.

[81] Steven Dahdah and James R Forbes. "System norm regularization methods for Koopman operator approximation". In: *Proceedings of the Royal Society A* 478.2265 (2022), p. 20220162.

[82] Amanda Bianco et al. "System Identification and Two-Degree-of-Freedom Control of Nonlinear, Viscoelastic Tissues". In: *IEEE Transactions on Biomedical Engineering* 69.12 (2022), pp. 3803–3811.

[83] Thomas Hitchcox and James Richard Forbes. "Mind the gap: Norm-aware adaptive robust loss for multivariate least-squares problems". In: *IEEE Robotics and Automation Letters* 7.3 (2022), pp. 7116–7123.

[84] Faraaz Ahmed, Ludwik Sobiesiak, and James Richard Forbes. "Model Predictive Control of a Tandem-Rotor Helicopter With a Nonuniformly Spaced Prediction Horizon". In: *IEEE Control Systems Letters* 6 (2022), pp. 2828–2833.

[85] Ken Lee and James Richard Forbes. "Position and attitude tracking control using CCW and SNI system theory with applications to multi-agent systems". In: *Automatica* 139 (2022), p. 110203.

[86] Timothy D Barfoot, James R Forbes, and Gabriele MT D'Eleuterio. "Vectorial parameterizations of pose". In: *Robotica* 40.7 (2022), pp. 2409–2427.

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[88] Daryoush Mirza-Hekmati et al. "Downspeeding diesel engines with two-stage turbochargers: Analysis and control considerations". In: *International Journal of Engine Research* 23.1 (2022), pp. 78–89.

[89] Charles Champagne Cossette et al. "Optimal multi-robot formations for relative pose estimation using range measurements". In: *2022 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*. 2022, pp. 2431–2437.

GROSS, WARREN

[90] Elie Ngomseu Mambou, Thibaud Tonnellier, and Warren J Gross. "Improved DC-Free Run-Length Limited 4B6B Codes for Concatenated Schemes". In: *IEEE Access* 10 (2022), pp. 21847–21852.

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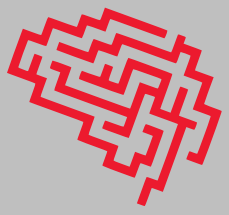

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