2018

CENTRE FOR INTELLIGENT MACHINES

ANNUAL REPORT

McGill

A message from the Centre Director

James Clark

The 33nd year of the Centre's existence brings renewed interest in Intelligent Systems

2018 brought two new associate members to the Centre - Professors Warren Gross and Narges Armanfard. both of the Department of Electrical and Computer Engineering

In 2018 the Centre researchers significantly enhanced their funding levels, showing a 43% increase in yearly financial support. This increase reflects the growing interest of industry in the areas of research being done by our members, particularly those related to applied Artificial Intelligence.

About the Centre

The McGill Centre for Intelligent Machines (CIM) is a multi-disciplinary, inter-departmental, inter-faculty research group formed in 1985 to 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 3 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 22 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 22 full members, at the end of 2018 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.

Professors:	22
PhD:	88
Masters:	95
Undergrad:	108
PostDoc:	22

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.

2018 Board Members

James Clark - Centre Director, Board Chair

James Nicell - Dean, Faculty of Engineering

Bruce Lennox - Dean, Faculty of Science

Chris Manfredi - Provost and Vice Principal, Academic

Martha Crago - Vice Principal, Research and Innovation

Greg Dudek - Centre Member

Frank Ferrie - Centre Member

Kaleem Siddiqi - Alternate Centre Member

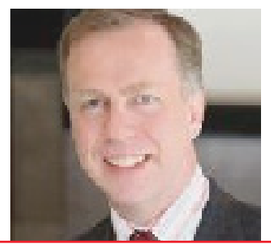
Pierre Breton - External Member, Executive Vice President, KWI Polymers.

Mohamad Afsari - Graduate Student

Centre Director, Professor James Clark, posing with some high performance computing from the early days of the Centre

Centre Membership

Full Members



James Clark
Professor
Centre Director

Department of Electrical and Computer Engineering

Computer Vision

Jorge Angeles
James McGill Professor

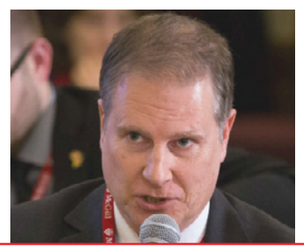
Department of Mechanical Engineering

Robotics and Mechatronics

Tal Arbel
Professor

Department of Electrical and Computer Engineering

Computer Vision and
Medical Image Analysis



Benoit Boulet
Associate Professor
Associate Dean

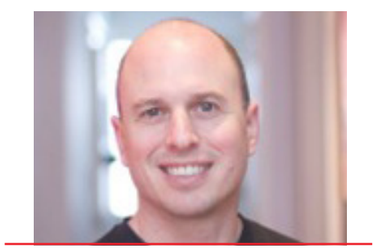
Department of Electrical and Computer Engineering

Systems and Control

Peter Caines
Macdonald Professor

Department of Electrical and Computer Engineering

Systems and Control



Jeremy Cooperstock
Professor

Department of Electrical and Computer Engineering

Human-Computer Interaction

Gregory Dudek
James McGill Professor

School of Computer Science

Robotics and Computer Vision

Frank Ferrie
Professor

Department of Electrical and Computer Engineering

Computer Vision

James Richard Forbes
Assistant Professor

Department of Mechanical Engineering

Robotics and Aerospace Systems

Jozsef Kovecses
Associate Professor

Department of 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

> *Professor Kövecses' leadership in the development of realistic computer simulations and his commitment to understand the industry's technical challenges has resulted in this exemplary partnership (McGill Reporter, May 1, 2018)*

Martin Levine
Professor

Department of Electrical and Computer Engineering

Computer Vision

Aditya Mahajan
Associate Professor

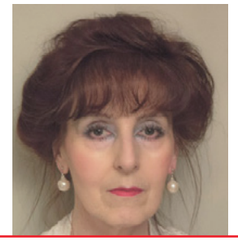
Department of Electrical and Computer Engineering

Systems and Control

David Meger
Assistant Professor

School of Computer Science

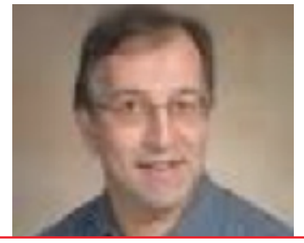
Robotics and Computer Vision



Hannah Michalska
Associate Professor

Department of Electrical and Computer Engineering

Systems and Control



Meyer Nahon
Professor
Chair, Mechanical Eng.

Department of Mechanical Engineering

Robotics and Aerospace Systems

Derek Nowrouzezahrai
Associate Professor

Department of Electrical and Computer Engineering

Computer Graphics

> *Back in 1985, Martin Levine was one of the first people working on and teaching Computer Vision – back then Pattern Recognition.* (*McGill Reporter, Jan. 16 2018*)

Joelle Pineau
Associate Professor

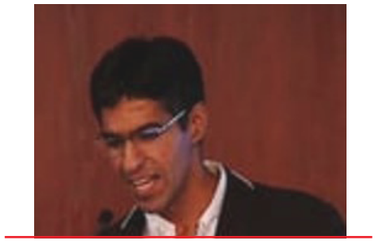
School of Computer Science

Machine Learning

Inna Sharf
Professor

Department of Mechanical Engineering

Robotics and Aerospace Systems



Kaleem Siddiqi
Professor

School of Computer Science

Computer Vision and Medical Image Analysis

Paul Zsombor-Murray
Associate Professor

Department of Mechanical Engineering

Robotic Mechanisms

Centre Support Staff

Centre Manager:	Marlene Gray
Computing Systems Manager:	Jan Binder
Administrator:	Chelsea Rogers
Computing Systems Support:	Nick Wilson

> *Pineau ... is now the driving force behind promising research emerging from McGill to improve treatment of cancer and heart disease using Artificial Intelligence (AI) models, methods and applications.s* (*McGill Reporter, May 1, 2018*)

Centre Membership
Associate Members

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

Armandfard, Narges - Assistant Professor, Elec. & Comp. 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

Gross, Warren - Professor and Chair, Elec. & Comp. 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, Computer Science, McGill University

Misra, Arun - Thomas Workman Professor, Mechanical Engineering, McGill University

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

Musallam, Sam - Associate Professor, CRC in Bioengineering, ECE, McGill University

Panangaden, Prakash - Professor, Computer Science, McGill University

Paranjape, Aditya - Lecturer, Department of Aeronautics, Imperial College London

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

Precup, Doina - Associate Professor, Computer Science, McGill University

Visitors to the Centre - 2018

The Centre regularly hosts researchers on long-term (one month or more) visits. These include professors from other Universities on sabbatical leave research exchange students and research collaborators from industry.

Andrea Sanchez Aguilar	McGill University - Hosted by David Meger
Mandana Samiei	Concordia University - Hosted by David Meger
Amir Molaei	Concordia University - Hosted by David Meger
Jiantong Ma	Intern - Hosted by Jeremy Cooperstock
Yaojun Wang	Zhejiang Sci-Tech University - Hosted by Jorge Angeles
Byung Kwon Choi	Baylor College of Medicine - Hosted by David Meger
Keehong Seo	Samsung Adv. Inst. Tech. - Hosted by David Meger
Hector Garcia Garcia	Washington Hospital Centre - Hosted by Jorge Angeles
Jingkun Zhang	Shanghai Jiao Tong University - Hosted by Jorge Angeles
Shu-Jun Liu	Sichuan University - Hosted by Peter Caines
A. Ghasemi Toudeshki	Simon Fraser University - Hosted by Gregory Dudek
Christopher Salmon	McGill University - Hosted by Kaleem Siddiq**i**

Joelle Pineau and Jozsef Kovecses being congratulated by Canada's Governor General Julie Payette (a former Centre student!)

Jorge Angeles being awarded the McGill Medal for Lifetime Achievements

Honours and Distinctions

Celebrating Excellence

The outstanding contributions made by the Centre's researchers are frequently recognized through awards and other distinctions. 2018 was no exception to this, with many honours bestowed on our members.

Professor James Richard Forbes became a William Dawson Scholar and was nominated for the Carrie M. Derick Award for Graduate Supervision and Teaching

Professor Jozsef Kovecses was awarded the NSERC Synergy Award which is one of the research prizes of NSERC, presented on May 1, 2018 by the Governor General of Canada in Ottawa.

He was also awarded the Best Paper Award of the 14th ASME International Conference on Multibody Systems, Nonlinear Dynamics, and Control, IDETC/CIE 2018, Quebec City, QC, Aug. 26-29, 2018, in the multibody systems category.

Professor Paul Kry was awarded the Carrie M. Derick award for graduate teaching and supervision.

Professor Michael Langer won the Canadian Image Processing and Pattern Recognition Society (CIPPRS) Lifetime Achievement Award for Service. The award was announced at the CRV conference in Toronto in May 2018.

Professor Joelle Pineau won the NSERC E.W.R. Steacie Memorial Fellowship which is awarded annually to enhance the career development of outstanding and highly promising scientists and engineers who are faculty members of Canadian universities.

Additionally, she was elected an AAAI Fellow which recognizes individuals who have made significant, sustained contributions to the field of artificial intelligence, awarded by the Association for the Advancement of Artificial Intelligence.

She was also named as a Canada CIFAR AI Chair.

Prof. Pineau was also named one of Canada's Inspiring Fifty 2018. "InspiringFifty is a non-profit that aims to increase diversity in tech by making female role models in tech more visible."

Professor Emeritus Jorge Angeles was awarded the 2018 McGill Medal for Lifetime Achievements

Tanya Nair, MICCAI 2018 Young Scientist Award Recipient. Awarded to Tanya Nair, a Master's student under the supervision of Prof. Arbel for their paper entitled: "Exploring Uncertainty Measures in Deep Networks for Multiple Sclerosis Lesion Detection and Segmentation". Awarded at the 2018 MICCAI Conference, Granada, Spain, September 2018.

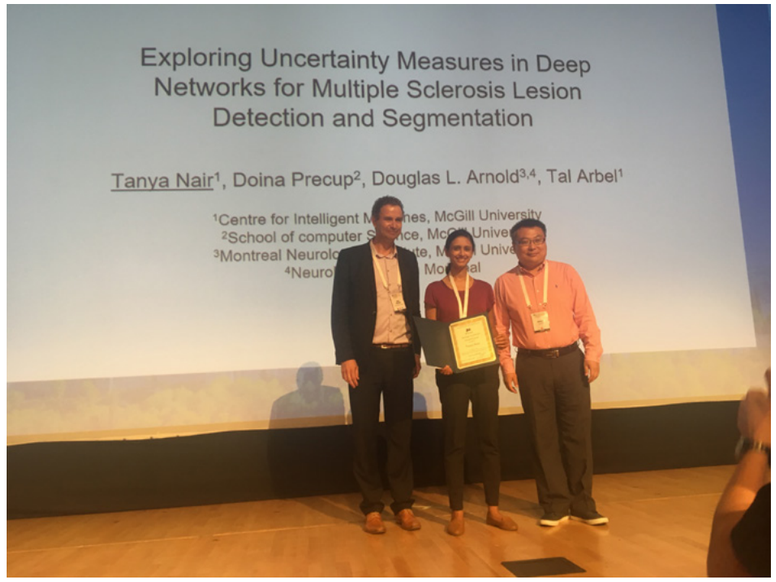
The MICCAI Young Scientist Awards recognize the highest quality papers (based on ranking) that are first authored by a student at the International Conference on Medical Image Computing and Computer Aided Intervention (MICCAI). A maximum of five YSAs are issued each year. Master's students are rarely (perhaps never) selected for this prize. The monetary value of the YSA is $500 USD.

Tanya Nair was also awarded the MICCAI 2018 Student Travel Award Recipient. Award given to students who are first authors of papers submitted to the MICCAI conference to subsidize their attendance at the conference. Award is given based on the ranking of the paper based on its quality.

Brennan Nichyporuk, supervised by Prof. Arbel, was awarded the McGill Summer Undergraduate Research in Engineering Award, 2018. Award given for his undergraduate summer research internship poster presentation for his project entitled: "Deep Learning for Prediction of Multiple Sclerosis Disease Activity"

Professors James Clark and Joelle Pineau were named as "Ambassadors" of the Palais des Congres in Montreal, for their efforts in bring large conferences to Montreal (ICCV21 and IJCAI21)

Mike Langer at the CRV 2018 conference, where he was awarded the CIPPRS Lifetime Achievement Award for his service to the Canadian Image Processing community



M.Eng. student STanya Nair being awarded the MICCAI Young Scientist Award

Former CIM PhD student Mehrsan Javan, co-founder of IAP member SPORTLOGiQ in the exhibition hall at the 2019 Neurips conference.

Industrial Affiliates Program

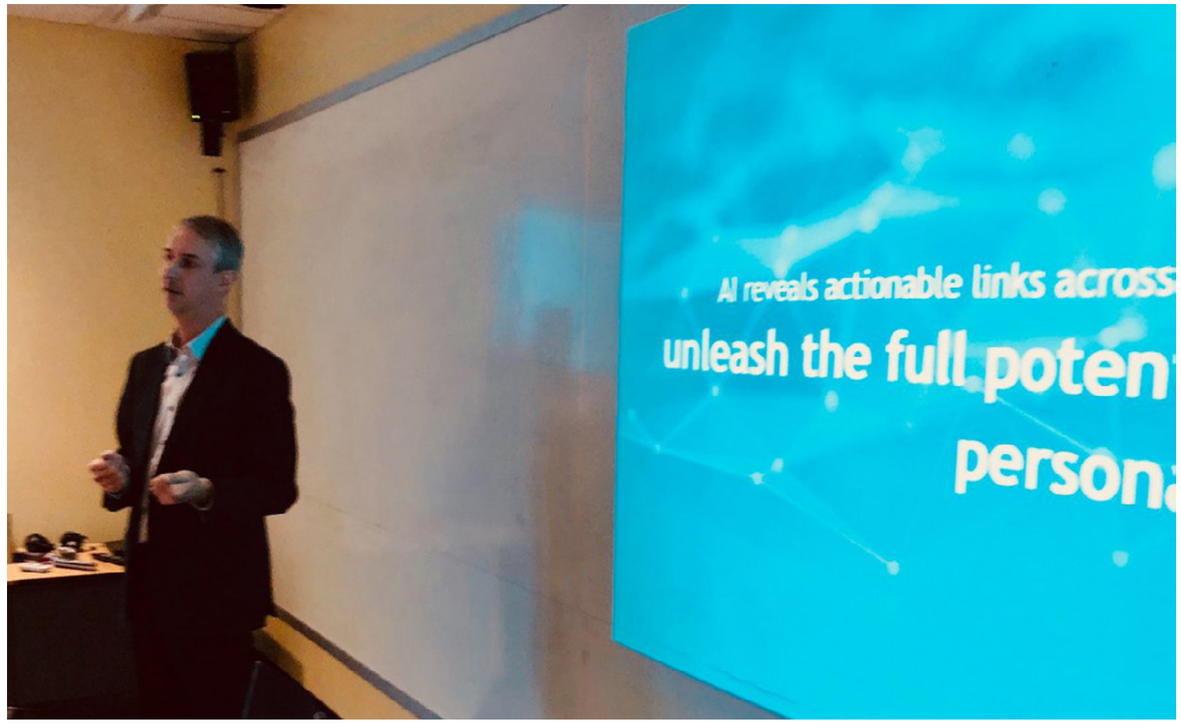
Connecting with Industry

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.

Industrial Affiliates in 2018

C2RO
Element AI
Envision
Huawei
Imagia
SimActive
SportlogiQ

PhD student Amir Haji-Abolhassani, representing IAP member C2RO at the Student Research Showcase.



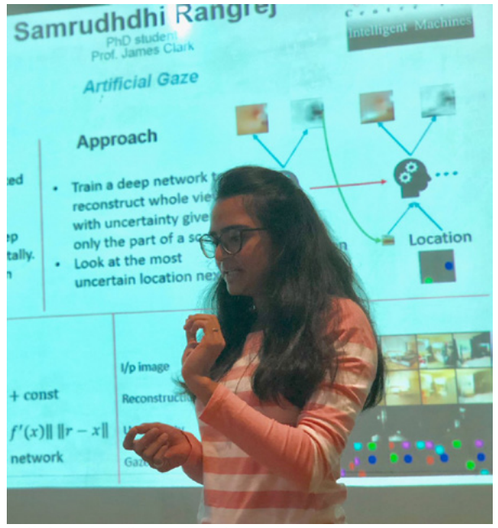
Alexandre LeBouthillier, founder of Imagia, talking about the applicatio of AI to medical image analysis

Centre Activities

Student Research Showcase

On November 13th, 2018, the annual Student Research Showcase was held, with 30+ students presenting short overviews of their research projects.

This year the showcase was attended by a number of members of the CIM Industrial Affiliates Program (IAP), some of whom gave short presentations on their company's research activities. Coffee breaks allowed for networking opportunities between students and IAP representatives.



PhD student Samrudhdhi Rangrej describing her PhD research

Former CIM PhD student Phillipe Simard, co-founder of IAP member SimActive giving a presentation on his company's products and services

An overflow crowd in the Zames Seminar Room expectantly awaits the start of the research presentations

Robert Thomas, US Consul General, Montreal, inspects an AQUA robot being assembled

Centre Activities

Visitors

The high reputation of the research and researchers of the Centre attracts a regular stream of visitors interested in knowing more about our work.

Visitors include academic researchers, government officials, industry representatives and high school students.

CIM is on the radar of governments around the world, known for its excellence in research and for production of top-quality researchers.

In January the Canadian Minister of Transport, Marc Garneau visited CIM to discuss AI and its applications to transportation.

In March CIM was visited by US Consul General Robert Thomas, who wanted to know what was going on in robotics research at CIM.

The growing importance of Artificial Intelligence (AI) to industry, led to frequent expressions of interest from companies in the expertise of CIM researchers. Many representatives of companies, such as DiDi Chuxing and Huawei came to visit the Centre in 2018. came expressing interest in working with the Centre.

Professor David Meger demonstrates the Kinova robot arm to the Canadian Minister of Transport, Marc Garneau

Eric Grimson, former Chancellor of MIT, talking about Computer Vision with CIM professors Arbel, Clark, Dudek and Siddiqi

Simon Blackmore from Harper Adams University, lecturing on Robotic Farming

Centre Activities

Seminars

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.

SPEAKERS

Dena Firoozi
McGill University

Benjamin Van Roy
Stanford University

Alex Daskalov
KN0X Industries, Montreal

Simon Blackmore
Robotics & Automation Institute,
Harper Adams University

Kei Nakatsuma
Kumamoto University

Yanyan Mu
McGill University

Sean Meyn
University of Florida

Katherine Driggs-Campbell
Stanford University

Rodolphe Sepulchre
Cambridge University

Leila Bridgeman
Duke University

Abhinoy Kumar Singh
McGill University

Aditya Mahajan
McGill University

Berk Calli
Yale University

Narges Armanfard
University of Toronto

Sylvain Baillet
McGill University

Ravi R. Mazumdar
University of Waterloo

Paul Zsombor-Murray
McGill University

Vicente Ordonez
University of Virginia

David Levanony
Ben Gurion University

Rinel Foguen Tchuendom
GERAD

Kurt S. Anderson
Rensselaer Polytechnic Institute

Bernard Brogliato
INRIA Rhone-Alpes,
Genoble, France

Jayakumar Subramanian
McGill University

Kenny Erleben
University of Copenhagen

Izchak Lewkowicz
Ben Gurion University

Ashutosh Nayyar
University of Southern California

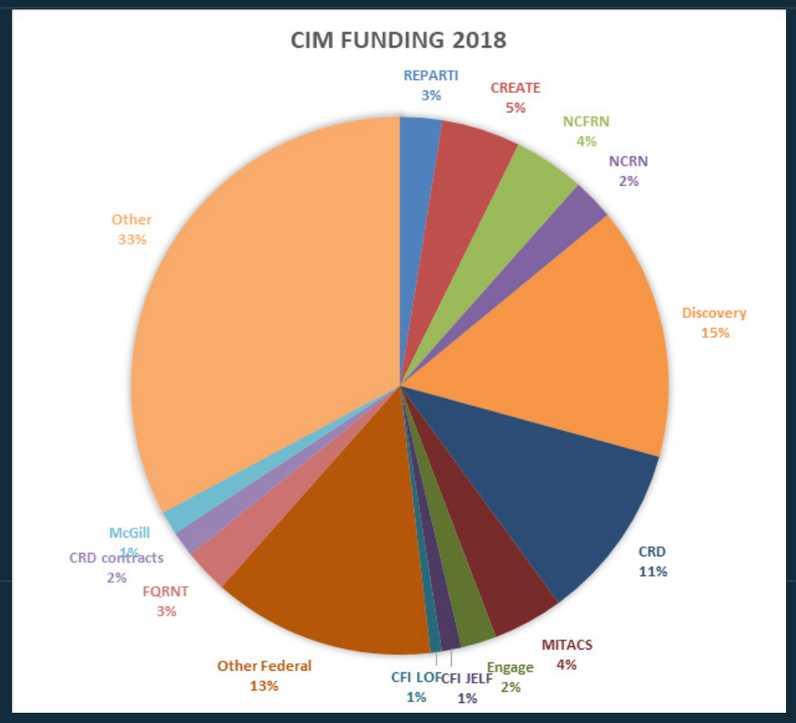
Christian Desrosiers
Ecole de Technologie Superieure

Yi Ouyang
Preferred Networks, Inc.

Richard Y. Zhang
University of California,
Berkeley

Andrew Lamperski
University of Minnesota

Annual Research Funding
Statistically Speaking



15%
from NSERC Discovery Grants

$6,232,578
Total funding in 2018

+43%
Increase in yearly funding

Research Funding
Fuel for Innovation

The research carried out in the Centre is funded from a wide range of sources, including the Governments of Canada and Quebec (primarily through NSERC Discovery and Partnership grants and FRQNT grants) as well as industry (through research contracts and contributions to governmental partnership programs).

In 2018 the Centre's research funding was buttressed by three large inter-university collaborative programs - the FRQNT-funded Regroupement REPARTI, the NSERC-funded CREATE program in Medical Image Analysis, and the NSERC funded Canadian Field Robotics Network.

Details on these cornerstone programs are provided over the next few pages.

Regroupement pour l'étude des environnements partagés intelligents répartis (REPARTI)

The regroupement REPARTI – Phase 2 (April 2013-March 2019) is a $2.6M inter-institutional, interdisciplinary collaborative venture comprised of 8 Quebec institutions, 35 members and over 300 students. The McGill node of REPARTI is represented by 13 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 (CIM).

The institutions participating in REPARTI are: Université Laval (host institution), McGill University, Université de Sherbrooke, Ēcole Polytechnique, Université de Montréal, Université du Québec à Chicoutimi 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:

(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.

The regroupement REPARTI was successfully renewed in 2013 for 6 years until 2019 and was renewed in 2019 for another 6 years until 2025. The new theme of the regroupement is cyberphysical systems.

NSERC Canadian Field Robotics Network

The NCFRN is a Canada-wide network spanning 8 universities and 14 partner organizations. The network 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 NCFRN supports the work of 11 researchers from 8 different universities. It connects the academic participants with 10 industrial partners and 4 government agencies to leverage their complementary experience and capabilities. The network investigates fundamental issues in robotics science as well as develops technologies developed addressing particularly Canadian problems such as environmental monitoring and maintenance, border surveillance, cleanup of environmental disasters, and assisting and caring for senior citizens.

The NCFRN primarily provides direct support for students, thereby training highly qualified new researchers, engineers and technicians able to work in robotics-related industry.

The NCFRN network management is hosted by McGill and CIM, with CIM member Greg Dudek serving as scientific director. CIM member Joelle Pineau serves as the leader of the thematic area "Human". CIM member Inna Sharf is also a research member of the NCFRN.

The NCFRN is a 5-year program that started on June 30, 2012 and ended on June 29, 2018.
A renewal of the network was submitted and approved. The network will now be called the NSERC Canadian Robotics Network, and is funded through 2024, and provides a national framework for 11 research groups from 8 Canadian universities as well as 9 industrial partners and 3 government agencies, while also engaging 5 international partners.

Funding Breakdown by Source

Collaborative Programs

FUNDING SOURCE	Start Date	End Date	Grant Total	CIM 2017
REPARTI (FRQNT Regroupement)	APRIL 2006	MARCH 2019	$4,000,000	$160,000
NSERC CREATE (Medical Image Analysis)	APRIL 2012	MARCH 2018	$1,650000	$300,000
NSERC Canadian Field Robotics Network	JUNE 2012	JUNE 2018	$5,000,000	$270,000

Individual Grants

NSERC Discovery			$4,628,000	$962,000
NSERC CRD+Engage			$2,202,068	$811,175
MITACS			$320,383	$267,583
CFI JELF & LOF			$289.500	$112,900
FRQNT			$557,453	$168,369
Others (including McGill contributions)			$8,714,819	$3,107,414
TOTALS OF ALL FUNDING SOURCES	-	-	**$36,004,223**	**$6,232,578**

PUBLICATIONS

ANGELES, Jorge

Wu, X., Angeles, J., Zou, T., Xiao, H., Li, W. and Lou, P., 2018, “Steering-angle computation for the multibody modelling of differential-driving mobile robots with a caster,” International Journal of Advanced Robotic Systems, Nov.-Dec. pp. 1-13. DOI: 10.1177/1729881418820166.

Setiawan, Y., Roozegar, M., Zou, T., Morozov, A. and Angeles, J., 2018, “A topology-change model of multi-speed transmissions in electric vehicles during gear-shifting,” Mechatronics, Vol. 55, pp. 151-161.

Zou, T., Angeles, J., and Hassani, F., 2018, “Dynamic modeling and trajectory tracking control of unmanned tracked vehicles,” Robotics and Autonomous Systems, Vol. 110, pp. 102-111.

Karimi Eskandary, P. and Angeles, J., 2018, “The virtual screw: Concept, design and applications,” Mechanism and Machine Theory, Vol. 128, pp. 349-358.

Morozov, A., Humphries, K., Zou, T., Rahman, T. and Angeles, J., 2018, “Design, analysis, and optimization of a multi-speed powertrain for class-7 electric trucks,” SAE International Journal, DOI:10.4271/08-07-01-0002.

Li, W., and Angeles, J., 2018, “Full-mobility 3-CCC parallel-kinematics machines: forward kinematics, singularity, workspace and dexterity analyses,” Mechanism and Machine Theory, Vol. 126, pp. 312-328.

Li, W. and Angeles, J., 2018, “The design for isotropy of a class of six-dof parallel-kinematics machines,” Mechanism and Machine Theory, Vol. 126, pp. 34-48.

Li, W., Howison, T., and Angeles, J., 2018, “On the use of the dual Euler-Rodrigues parameters in the numerical solution of the inverse-displacement problem,” Mechanism and Machine Theory, Vol. 125, pp. 21-33.

Zou, T., and Angeles, J., 2018, “An algorithm for rigid-body angular velocity and attitude estimation based on isotropic accelerometer strapdowns,” ASME Journal of Applied Mechanics, Vol. 85, Issue 6, pp. 061010-1--061010-10, DOI: 10.1115/1.4039435.

Shan, X., Angeles, J. and Forbes, J.R., 2018, “Design of a Biaxial High Frequency-ratio Low-g MEMS Accelerometer,” Microsystem Technologies, DOI 10.1007/s00542-018-3862-x.

Li, W., and Angeles, J., 2018, “The design of a 3-CPS parallel robot for maximum dexterity,” Mechanism and Machine Theory, Vol. 122, pp. 279-291.

Roozegar, M. and Angeles, J., 2018, “A two-phase control algorithm for gear-shifting in a novel multi-speed transmission for electric vehicles,” Mechanical Systems and Signal Processing, Vol. 104, pp. 145-154.

Setiawan, Y., Roozegar, M., Zou, T. and Angeles, J., 2018, “A mathematical model of multi-speed transmissions in electric vehicles in the presence of gear-shifting,” IEEE Transactions on Vehicular Technology, Vol. 67, No. 1, pp. 397-408.

Karimi Eskandary, P. and Angeles, J., 2018, “The translating Π-joint: design and applications,” Mechanism and Machine Theory, Vol. 122, pp. 361-370.

Li, W., and Angeles, J., 2018, “Full-mobility 3-CCC parallel-kinematics machines: Kinematics and isotropic design,” ASME Journal of Mechanism and Robotics, Vol. 10, No. 1, pp. 011011-01-011011-11.

Karimi Eskandary, P. and Angeles, J., 2018, “The dynamics of a parallel Schönflies-motion generator,” Mechanism and Machine Theory, Vol. 119, pp. 119-129.

Liauw, Y.D.S., Roozegar, M., Zou, T., Morozov, A., and Angeles, J., 2018, “Range Model of Electric Vehicles with Multi-speed Transmissions,’’ Paper DETC2018-85119, Proc. ASME 2018 Int. Design Engineering Technical Conferences & Computers and Information in Engineering Conference IDETC/CIE 2018, August 26-29, Quebec City, Volume 3, DOI:10.1115/DETC2018-85119.

Sun, Q., Angeles, J., and Forbes, J.R., 2018, “Elastostatics of a full-mobility PKM with flexible links,’’ ROMANSY 22 - Robot Design, Dynamics and Control, June 25-38, Rennes, France, pp. 34-41.

ARBEL, Tal

Q. Tian*, T. Arbel and J. J. Clark, “Structured Deep Fisher Pruning for Efficient Facial Trait Classification”, Image and Vision Computing, Special issue on Biometric in the Wild, Vol. 77, pp. 45-59, September 2018.

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Pandey, A., Ghoshal, D.P. and Michalska, H., 2018, June. Variational Approach to Joint Linear Model and State Estimation. In 2018 Annual American Control Conference (ACC) (pp. 3520-3525). IEEE.

Roozegar, M., Angeles, J. and Michalska, H., 2018, June. Optimal Control Problems with Terminal Control Constraints and Benefits of Over-Actuation. In 2018 Annual American Control Conference (ACC) (pp. 4129-4134). IEEE.

Sridhar, D. and Michalska, H., 2018, December. Non-Asymptotic State and Input Estimation for Smooth Linear Parameter Varying Systems. In 2018 IEEE Conference on Decision and Control (CDC) (pp. 686-693). IEEE.

NAHON, Meyer

J. Levin, A. Paranjape and M. Nahon, 2018, ‘Sideslip and Slipstream in Extreme Maneuvering with Fixed-Wing Unmanned Aerial Vehicles’, AIAA Journal of Guidance, Control and Dynamics, Vol. 41, No. 7, pp. 1610-1616.

M. Al-Solihat and M. Nahon, 2018, ‘Flexible Multibody Dynamic Modeling of a Floating Wind Turbine’, International Journal of Mechanical Sciences, Vol. 142–143, pp. 518–529.

M. Al-Solihat and M. Nahon, 2018, ‘Three-Dimensional Nonlinear Coupled Dynamic Modeling of a Tip-Loaded Rotating Cantilever’, Journal of Vibration and Control, Volume 24, No. 22, pp. 5366–5378.

E. Bulka and M. Nahon, 2018, ‘Autonomous Fixed-Wing Aerobatics: From Theory to Flight’, International Conference on Robotics and Automation (ICRA2018), Brisbane, Australia, May 21-25.

R. Chiappinelli and M. Nahon, 2018, ‘Modeling and Control of a Tailsitter UAV’, International Conference on Unmanned Aircraft Systems (ICUAS’18), Dallas, TX, June 12-15.

M. Butt, M. Paidoussis and M. Nahon, 2018, ‘An Investigation into the Dynamics of Pipes Aspirating Fluid’, Proceedings of the ASME 2018 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference (IDETC/CIE 2018), Quebec City, Aug. 30-Sept. 2.

J. Levin, A. Paranjape and M. Nahon, 2018, ‘Motion Planning for a Small Aerobatic Fixed-Wing Unmanned Aerial Vehicle’, IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2018), Madrid, October, 1-5.

E. Bulka and M. Nahon, 2018, ‘A Universal Controller for Unmanned Aerial Vehicles’, IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2018), Madrid, October, 1-5.

NOWROUZEZAHRAI, Derek

Sebastian Herholz, Yangyang Zhao, Oskar Elek, Derek Nowrouzezahrai, Hendrik Lensch and Jaroslav Krivanek. “Volume Path Guiding using Zero-variance Random Walk Theory”. ACM Transaction on Graphics (November 2018).

Luis Eduardo Gamboa, Jean-Philippe Guertin and Derek Nowrouzezahrai. “Scalable Appearance Filtering for Complex Lighting Effects”. ACM Transaction on Graphics - Proceedings of the SIGGRAPH Asia Conference (Novermber 2018). 10 pages.

Binh-Son Hua, Adriend Gruson, Nicolas Vibert, Derek Nowrouzezahra and Toshiya Hachisuka. “Gradient-domain Volumetric Photon Density Estimation”. ACM Transactions on Graphics - Proceedings of the SIGGRAPH Conference (August 2018). 12 pages.

Hsueh-Ti Derek Liu, Michael Tao, Chun-Liang Li, Derek Nowrouzezahrai and Alec Jacobson. “Beyond Pixel Norm-Balls: Parametric Adversaries using an Analytically Differentiable Renderer”. International Conference on Learning Representations (ICLR; December 2018). 16 pages.

Cyril Soler, Kartic Subr and Derek Nowrouzezahrai. “A Versatile Parameterization for Measured Material Manifolds”. Presented at the Eurographics International Conference - Computer Graphics Journal (April 2018), 10 pages

Binh-Son Hua, Adrien Gruson, Victor Petitjean, Matthias Zwicker, Derek Nowrouzezahrai, Elmar Eisemann and Toshiya Hachisuka. “A Survey on Gradient-domain Rendering”. Eurographics State-of-the-art Reports. Eurographics Association (December 2018). 16 pages.

Chakravarty Alla Reddy Chaitanya, John Snyder, Keith Godin, Derek Nowrouzezahrai and Nikunj Raghuvanshi. “Adaptive Sampling for Sound Propagation”. IEEE Conference on Virtual Reality and 3D User Interfaces (IEEE VR; December 2018). 10 pages.

PINEAU, Joelle

V. Francois-Lavet, P. Henderson, R. Islam, M. Bellemare, J. Pineau. \An Introduction to Deep Reinforcement Learning”. Foundations and Trends in Machine Learning. 11 (3-4). pp.219-354. 2018.

I. V. Serban, R. Lowe, P. Henderson, L. Charlin, J. Pineau. \A Survey of Available Corpora for Building Data-Driven Dialogue Systems: The Journal Version”. Dialogue & Discourse. 9 (1). pp.1-49. 2018.

A. Durand, O. Maillard, J. Pineau. \Streaming kernel regression with provably adaptive mean, variance, and regularization”. Journal of Machine Learning Research. 19. pp.1-34. 2018.

P. Henderson,R. Islam, P. Bachman, J. Pineau, D. Precup, D. Meger.\Deep Reinforcement Learning that Matters”. AAAI. 7 pages. 2018.

P. Henderson, W-D. Chang, P.L. Bacon, D. Meger, J. Pineau, D. Precup. \OptionGAN: Learning Joint Reward-Policy Options using Generative Adversarial Inverse Reinforcement Learning”. AAAI. 7 pages. 2018.

P. Henderson, K. Sinha, N. Angelard-Gontier, N.R. Ke, G. Fried, R. Lowe, J. Pineau. \Ethical Challenges in Data-Driven Dialogue Systems”. AAAI/ACM Conference on Artificial Intelligence, Ethics, and Society. 7 pages. 2018.

M. Smith, H. van Hoof, J. Pineau. \An Inference-Based Policy Gradient Method for Learning Options”. ICML. 8 pages. 2018.

A. Durand, C. Achilleos, D. Iacovides, K. Strati, T. Mitsis, J. Pineau. \Contextual Bandits for Adapting Treatment in a Mouse Model of de Novo Carcinogenesis”. Machine Learning for Healthcare. pp.67-82 2018.

P. Thodoro, A. Durand, J. Pineau, D. Precup. \Temporal Regularization for Markov Decision Processes”.

NeurIPS (formerly NIPS). 8 pages. 2018.

P. Parthasarathi, J. Pineau. \Extending Neural Generative Conversational Model using External Knowledge Sources”. EMNLP. 6 pages. 2018.

J. Romo, P. Henderson, A. Piche, V. Francois-Lavet, J. Pineau. \Reward Estimation forVariance Reduction in Deep Reinforcement Learning”. International Conference on Robot Learning (CoRL). 11 pages. 2018.

P. Henderson, J. Romo, J. Pineau. \Where Did My Optimum Go?: An Empirical Analysis of Gradient Descent Optimization in Policy Gradient Methods”. EWRL. 2018.

A. Touati, H. Satija, J. Romo, J. Pineau, P. Vincent. \ Randomized Value Functions via Multiplicative Normalizing Flows”. 8 pages. EWRL. 2018.

SHARF, Inna

St-Onge D, Sharf I, Sagnières LBM*, Gosselin C. (2018). A Deployable Mechanism Concept for the Collection of Small-to-Medium-Size Space Debris. Advances in Space Research. 61: 1286-1297.

Botta EM*, Sharf I, Misra AK. (2018). Simulation of Tether-Nets for Capture of Space Debris and Small Asteroids. Acta Astronautica.

Sagnières LBM*, Sharf I. (2018). Long-term rotational motion analysis and comparison to observations of the inoperative Envisat. Journal of Guidance, Control, and Dynamics. : 1-13.

Sagnières, LBM*, Sharf, I., Deleflie, F. (2018). Investigation into the rotational dynamics of the defunct spacecraft TOPEX/Poseidon. 21st International Workshop on Laser Ranging, Canberra.

Dicker G, Sharf I, Rustagi, P*. (2018). Recovery Control for Quadrotor UAV Colliding with a Pole. Proceedings of. IEEE/RSJ International Conference on Intelligent Robots and Systems, Madrid, Spain (1-8)

Sagnières, LBM*, Sharf, I., Deleflie, F. (2018). Validation of a novel coupled orbit-attitude propagator by comparison to SLR data and light curves. Proceedings of the International Astronautical Congress, IAC. 69th International Astronautical Congress, Bremen, Germany

Jorgensen M*, Sharf I. (2018). Planning and optimization for a multiple space debris removal mission. 2018. IEEE Aerospace Conference, Big Sky, United States (1-10)

SIDDIQI, Kaleem

J. Wilder, M. Rezanejad, S. Dickinson, K. Siddiqi, A. Jepson and D. B. Walther. Local contour symmetry facilitates scene categorization. Cognition, 182, 307-317, 2019. (open source article printed online Dec 2018, in print 2019).

T. A. Armstrong, A. Kadivar, P. Savadjiev, S. W. Zucker and K. Siddiqi. Conduction in the Heart Wall: Helicoidal Fibers Minimize Difusion Bias. Scientific Reports, 8:7165, 2018, doi:10.1038/s41598-018-25334-7

C. Wang, B. Samari and K. Siddiqi. Local Spectral Graph Convolution for Point Set Feature Learning. In European Conference on Computer Vision (ECCV, Munich, Germany), September 2018.

C. Wang, B. Samari and K. Siddiqi. Local Spectral Graph Convolution for Point Set Feature Learning. In European Conference on Computer Vision (ECCV, Munich, Germany), September 2018.

T. Syed, B. Samari and K. Siddiqi. Estimating Sheets in the Heart Wall. In Statistical Atlases and Computational Modelling of the Heart Workshop (STACOM, Granada, Spain), September 2018

J. Wilder, M. Rezanejad, K. Siddiqi, S. Dickinson, A. Jepson and D. Bernhardt-Walther. Measuring Local Symmetry in Real-World Scenes. In Vision Sciences Society Conference (St. Pete Beach, United States), May 2018.

M. Rezanejad, J. Wilder, K. Siddiqi, S. Dickinson, A. Jepson and D. Bernhardt-Walther. Measuring Local Symmetry in Real-World Scenes Using Derivatives of the Medial Axis Radius Function. In Computational and Mathematical Models in Vision (MODVIS, St. Pete Beach, United States), May 2018.

INVITED LECTURES

ARBEL, Tal

Invited speaker, “Machine Learning for Lesion and Tumour Detection, Segmentation and Disease Prediction in Medical Images”, Machine Learning for Biomedical Data Workshop, Montreal, Quebec, Canada, December 2018.

Invited speaker, “Machine Learning for Lesion and Tumour Detection, Segmentation and and Disease Prediction in Medical Images”, Google Brain, Montreal, Quebec, October 2018.

Invited panelist, Roundtable Panel Session, 2018 Trottier Public Science Symposium, “Minding the Future: Living in a High-Tech World”, October 29, 2018.

Invited speaker: “Machine learning and health: Needs and innovations (with focus on computer vision and medical imaging)”, Women in Bio Greater Montreal, “Disruptive Technologies in the Life Sciences and Healthcare”, June 12, 2018. https://www.womeninbio.org/events/EventDetails.aspx?id=1109391&group=

Invited speaker, “Probabilistic Vision Group Research Program”, Promotion of Opportunities for Women (POWE) Conference for High School Students, McGill University, Feb. 8, 2018.

BOULET, Benoit

Boulet, B., Development of Electric and Autonomous Vehicles at McGill’s Centre for Intelligent Machines. Presentation to BJEV and NEVC at Propulsion Quebec, Montreal, Quebec, Canada, October 18, 2018.

Boulet, B., Development of Electric and Autonomous Vehicles at McGill’s Centre for Intelligent Machines. New Energy Vehicle roundtable presentation with China South Industries Group, Foton, Baidu, Wanji Technology, Horizon Robotics, CSP Victall, PEPS, BAIC, Didi, BJEV, NEVC at the Canadian Embassy, Beijing, China, September 25, 2018.

Boulet, B., Development of Electric and Autonomous Vehicles at McGill’s Centre for Intelligent Machines. Presentation, Shanghai Automotive Industry Corporation (SAIC) Motors, Shanghai, China, September 27, 2018.

Boulet, B., Development of Electric and Autonomous Vehicles at McGill’s Centre for Intelligent Machines. Presentation, Society of Automotive Engineers of China, Beijing, China, September 25, 2018.

Boulet, B., Development of Electric and Autonomous Vehicles at McGill’s Centre for Intelligent Machines. Presentation, China Automotive Technology and Research Centre (CATARC), Tianjin, China, September 26, 2018.

Boulet, B., Development of multispeed ratio drivetrains for electric vehicles at McGill’s Centre for Intelligent Machines, Presentation, Shanghai Jiao Tong University, Institute of Automotive Engineering, Shanghai, China, September 27, 2018.

Boulet, B., Development of multispeed ratio drivetrains for electric vehicles at McGill’s Centre for Intelligent Machines, Presentation, Tongji University, College of Automotive Engineering, Shanghai, China, September 28, 2018.

CAINES, Peter

University of Illinios at Urbana - Champagne : Colloquium talk: Graphon Mean Field Games and the GMFG Equations” March, 2018

City University of Hong Kong: Department of Mathematics “Decentralized Control of Systems on Infinite Networks and the Graphon MFG Equations” 23 July 2018.

Invited speaker at the Sean Meyn Birthday Festschrift event, IEEE Conference on Decision and Control, December, 2018

COOPERSTOCK, Jeremy

“What’s around me? Audio augmented reality for blind users with a smartphone, Pint of Science, Montreal, May 15, 2018.

Ami-Télé, Ça me regarde, televsion broadcast on lab’s activities for the visually impaired community, February 8, 2018

“I Feel the Earth Move (Under My Feet): Haptic Interaction for Telepresence and Information Delivery”, Information Systems Seminar, University of Haifa, November 7, 2018.

“Learning from sparse feedback: Adapting an environmental awareness app to visually impaired user preferences”, ACM-SIGCHI sponsored summer school on Intelligent User Interfaces in the Era of IoT and Smart Environments, Haifa, Israel, October 3, 2018.

DUDEK, Greg

Invited Keynote Presentation, Huawei-sponsored Strategy and Technology Workshop (STW) for Chinese company leadership, Huawei Corporate Technology Strategy Department and Overseas Research Institutes, Shenzhen, May 2018.

Invited Keynote Presentation, CRV 2018, Toronto, May 2018.

Invited Presentation, J Tsotsos Honorary Symposium, York University, Toronto, May 2018.

Invited Keynote Presentation, “Robots that for for, and work with, humans,” IEEE Research Boost, Ecole de Technologie Sup., April 2018.

Invited Presentation, “Building the Aqua2 Robot Family,” ProductTank - Mind the Product, March 2018.

FORBES, James Richard

J. R. Forbes, “Pose Estimation via the Weighted Optimal Linear Translational Attitude Estimation (WOLATE) Algorithm,” Lund University, Lund, Sweden, August 20, 2018. Invited Speaker.

J. R. Forbes, “H1-Optimal Parallel Feedforward Control,” 8th Biennial Meeting on Systems and Control Theory, University of Toronto, Toronto, ON, May 7-9, 2018.

KOVECSES, Jozsef

Kövecses, J.: “Dynamics: Novel Perspectives for Design, Simulation, and Control”, research seminar at the University of California at Davis, Davis, CA, May 10, 2018.

Kövecses, J.: “Redundancy: A Challenge in Dynamics Simulation”, invited presentation at the 2018 IEEE International Conference on Simulation, Modeling, and Programming for Autonomous Robots (SIMPAR 2018), Brisbane, Australia, May 17, 2018.

Kövecses, J.: “Mechanical Modelling in the Simulation and Analysis of Dynamic Systems”, research seminar at the University of La Coruna, Ferrol, Spain, June 7, 2018.

Kövecses, J.: “Mechanical Modelling in the Simulation and Analysis of Dynamic Systems”, research seminar at Keio University, Yokohama, Japan, July 9, 2018.

Kövecses, J.: “Task-level Representations in the Modelling of Mechanical Systems”, research seminar at the the Budapest University of Technology and Economics, Oct. 5, 2018.

Kövecses, J.: “Task-level Modelling of Mechanical Systems for Intelligent Robotics”, plenary talk at the IEEE 18th International Symposium on Computational Intelligence and Informatics, Budapest, Hungary, Nov. 21-22, 2018.

KRY, Paul

Shenzhen Visual Computing Summer School, invited presentation, Shenzhen, China, 16 July 2018, Physics Based Computer Animation Fundamentals.

Beijing Film Academy, invited presentation, Beijing, China, 23 July 2018, Geometric Stiffness for Real-time Constrained Multi-body Dynamics

LANGER, Michael

Depth Perception in 3D Clutter, Justus-Liebig-Universitaet Giessen (University of Giessen), Germany (Invited Department colloquium) Aug. 20, 2018

Depth Perception in 3D Clutter: Cues and Priors, Max-Planck-Institute for Biological Cybernetics, Tuebingen, Germany (Invited talk at Colloquium celebrating retirement

of Director Heinrich Buelthoff) Aug. 22, 2018

MAHAJAN, Aditya

“Remote estimation over channels with state and feedback,” Information Theory and Applications (ITA) Workshop, San Diego, CA, Feb 11–16, 2018.

“On the separation of estimation and control in hierarchical control systems with communication cost,” Conference on Information Sciences and Systems (CISS), Princeton, CA, March 21–23, 2018.

“Optimal sampling of multiple linear processes over a shared medium,” IEEE Conference on Decision and Control, Miami, Florida, Dec 17–19, 2018.

“Team optimal decentralized state estimation,” IEEE Conference on Decision and Control, Miami, Florida, Dec 17–19, 2018.

MEGER, David

IEEE Canadian Ambassador at the IEEE Convene Conference, panel speaker for Montreal’s AI Revolution. Berlin, Germany. 2018/7/20.

3D Perception and Deep RL That Matters. Self-driving Research Workshop at Huawei Canada Montreal Office. 2018/8/3

Panel speaker on the Demystify AI Panel, Desautels Faculty of Management Technology Club. Montreal, Quebec. 2018/11/20

NAHON, Meyer

‘Dynamics and Control of Agile Fixed-Wing UAVs’, Dec. 7, 2018, the Centre for Aerial Robotics Research and Education, University of Toronto

NOWROUZEZAHRAI, Derek

Data Science: From Linear Algebra to Deep Learning. Invited Talk. Ubisoft Montreal. Host: Audrey Belanger. September 2018.

Deep Learning Applications for Realistic, Simulation-based Computer Graphics. Invited Researcher Tea Talk. Ubisoft Montreal. Host: Dr. Yves Jaquier October 2018.

Realistic Computer Graphics: the numerics behind pretty pictures. Distinguished Researcher Talk Series. ElementAI. Host: Dr. Philippe Beaudoin - Senior VP. September 2018.

Realistic Computer Graphics: the numerics behind pretty pictures. Distinguished Researcher Talk Series. Google Brain Montreal. Host: Dr. Hugo Larochelle. March 2018

PINEAU, Joelle

Feb.22 2018: Invited Talk, Machine Learning @ Georgia Tech Spring Lecture Event. Atlanta, GA.

Oct.11 2018: Keynote Talk, BayLearn 2018: Bay Area Machine Learning Symposium, Menlo Park, CA.

May 3 2018: Keynote for ICLR conference. Vancouver, Canada.

May 9 2018: Invited Talk, MIT. Boston, MA.

Aug.9 2018: Keynote Talk, UAI 2018: Association for Uncertainty in Articial Intelligence, Monterey Bay, CA.

Oct.3 2018: Keynote Talk, EWRL 2018: European Workshop on Reinforcement Learning, Lille, France.

Oct.30 2018: Keynote Talk, CoRL 2018: Conference on Robot Learning, Zurich, Switzlerland.

Oct.31 2018: Invited Talk, EPFL IC Colloquia, Lausanne, Switzerland

Dec.5 2018: Keynote Talk, NeurIPS 2018: Neural information Processing Systems, Montreal, Canada.

May 16 2018: Keynote Talk, ICPRAI conference. Montreal, Canada.

May 30 2018: Invited Talk, AI4Good Summer program. Montreal, Canada.

Jun.25 2018: Keynote Talk, USI: Unsuspected Sources of Inspiration. Paris, France.

Sep.26 2018: Invited Talk, Syndemics Workshop, Toronto, Canada.

Oct.24 2018: Invited Talk, Library of parliament, Ottawa, Canada.

Nov.19 2018: Invited Talk,Workshop on Computational Medicine. McGill, Montreal, Canada.

Dec.8 2018: Invited Talk, NeurIPS Worskhop on Reinforcement Learning in Partial Observability

Road to 200. McGill alumni event. Presentation and Q&A, events in San Francisco, Calgary, Vancouver

SHARF, Inna

“My research at McGill,” Invited Presentation at MAME Annual Industry dinner, February 6, 2018

Invited speaker and panellist at the Quebec-Bavaria International Collaboration in Advanced Mobility and Artificial Intelligence workshop, May 15, 2018 McGill Faculty Club

“ Robots in the Sky: Drones, Space Clean-up and Beyond”, Invited presentation at Talk at Pint of Science, Montreal, May 16, 2018

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