



# 9<sup>th</sup> INTERNATIONAL CONFERENCE ON CONTROL DYNAMIC SYSTEMS, AND ROBOTICS (CDSR'22)



**JUNE 02 - 04 2022 | Niagara Falls, Canada**

<b>Thursday, June 2</b>		<b>3:00 PM to 5:00 PM Registrations and Networking</b>	
<b>Friday, June 3</b>		<b>Saturday, June 4</b>	
<b>Promenade Suit 1</b>		<b>Promenade Suit 1</b>	
<b>7:30 AM</b>	Registration		<b>KEYNOTE SESSION</b>
<b>8:30 AM</b>	Official Opening of the Conference Dr. Aparicio Carranza, New York City College of Technology, USA	<b>8:30 AM</b>	<b>Keynote Lecture 2:</b> Dr. Huazhen Fang, University of Kansas, USA - PAGE 7
	<b>PLENARY SESSION</b>		<b>PLENARY SESSION</b>
<b>8:45 AM</b>	<b>Plenary Lecture 1:</b> Dr. Xinzhi Liu, University of Waterloo, Canada - PAGE 1	<b>9:15 AM</b>	<b>Plenary Lecture 4:</b> Dr. John Doyle, California Institute of Technology, USA - PAGE 7
<b>09:40 AM</b>	<b>Plenary Lecture 2:</b> Dr. Rodolphe Sepulchre, University of Cambridge, UK - PAGE 2	<b>10:10 AM</b>	Coffee Break
<b>10:35 AM</b>	Coffee Break		<b>PLENARY SESSION</b>
	<b>KEYNOTE SESSION</b>	<b>10:30 AM</b>	<b>Plenary Lecture 5:</b> Dr. Deepa Kundur, University of Toronto, Canada - PAGE 8
<b>10:55 AM</b>	<b>Keynote Lecture 1:</b> Dr. Behrad Khamesee, University of Waterloo, Canada - PAGE 3		<b>MORNING SESSION</b>
	<b>MORNING SESSION</b>	<b>11:25 PM</b>	Robotics II - PAGE 9
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<b>12:45 PM</b>	Group Photo	<b>12:15 PM</b>	Modeling of Complex Systems -PAGE 10
<b>12:50 PM</b>	Lunch - NIAGARA WEST	<b>01:00 PM</b>	Lunch - NIAGARA WEST
	<b>PLENARY SESSION</b>	<b>8:00 PM</b>	<b>Banquet Dinner</b> - PAGE 10 - NIAGARA WEST
<b>1:45 PM</b>	<b>Plenary Lecture 3:</b> Dr. Simon Yang, University of Guelph, Canada - PAGE 5		
	<b>AFTERNOON SESSION</b>		
<b>2:40 PM</b>	CONTROL SYSTEM AND APPLICATION - PAGE 6		
<b>4:10 PM</b>	Coffee Break		

**9<sup>th</sup> INTERNATIONAL CONFERENCE ON CONTROL  
DYNAMIC SYSTEMS, AND ROBOTICS (CDSR'22)**

JUNE 02 - 04, 2022 | Niagara Falls, CANADA

The Organizing and Scientific Committees would like to welcome you to the 9<sup>th</sup> International Conference of Control, Dynamic Systems, and Robotics (CDSR'22).

The 9<sup>th</sup> International Conference of Control, Dynamic Systems, and Robotics (CDSR'22) aims to become one of the leading international annual events in the fields of traditional and modern control and dynamic systems. This Conference will provide excellent opportunities for scientists, researchers, and industrial specialists to present their research achievements and to develop new collaborations and partnerships with experts in the field.

The conference is organized in Niagara Falls, Ontario, which is a Canadian city at the famous waterfalls of the same name, linked with the U.S. by the Rainbow Bridge, and we hope you will have time to enjoy the ambience and hospitality of this city.

We thank you for your participation and contribution to the 9<sup>th</sup> International Conference of Control, Dynamic Systems, and Robotics (CDSR'22).

We wish you a very successful and enjoyable experience.

**Dr. Aparicio Carranza**

New York City College of Technology,  
USA  
Conference Chair, CDSR'22

**Dr. Yang Shi**

University of Victoria, Canada  
Conference Co-Chair, CDSR'22

# 9<sup>th</sup> INTERNATIONAL CONFERENCE ON CONTROL DYNAMIC SYSTEMS AND ROBOTICS (CDSR'22)

The Organizing Committee of the 9<sup>th</sup> International Conference of Control, Dynamic Systems, and Robotics (CDSR'22) would like to thank the following members for accepting to contribute to the conference.

Scientific Committee Members:

*Dr. Christos Anagnostopoulos*, University of Glasgow, UK

*Dr. Nasser L. Azad*, University of Waterloo, Canada

*Dr. Gary M. Bone*, McMaster University, Canada

*Dr. Lahouari Cheded*, King Fahd University of Petroleum and Minerals, KSA

*Dr. M. Reza Emami*, University of Toronto, Canada

*Dr. Jan Huissoon*, University of Waterloo, Canada

*Dr. Jeff Pieper*, University of Calgary, Canada

*Dr. Eduardo M.G. Rodrigues*, Management and Production Technologies of Northern Aveiro, Portugal

*Dr. Emre Sariyildiz*, University of Wollongong, Australia

*Dr. Nariman Sepehri*, University of Manitoba, Canada

*Dr. Ning Sun*, Nankai University, China

*Dr. Bin Wei*, University of Guelph, Canada

*Dr. Jiangfan Yu*, The Chinese University of Hong Kong, Hong Kong



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University of Cambridge, UK

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University of Guelph, Canada

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USA

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**Modeling of Complex Systems**

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7:30 AM - 8:30 AM **Registration**

8:30 AM - 8:45 AM **Official Opening**

**Dr. Aparicio Carranza, New York City College of Technology, USA**

KEYNOTE SESSIONS

8:45 AM - 09:40 AM **Plenary Lecture**

**SESSION CHAIR:**

**Dr. Aparicio Carranza, New York City College of Technology, USA**



**Hybrid Formation Control of Multi-Agent Systems**

*Dr. Xinzhi Liu,  
University of Waterloo, Canada*

Xinzhi Liu received the B.S. degree in mathematics from Shandong Normal University in 1982 and the Ph.D. degree in applied mathematics from University of Texas at Arlington in 1988. He was a Post-Doctoral Fellow at University of Alberta from 1988 to 1990. Then he joined the Department of Applied Mathematics, University of Waterloo as an Assistant Professor, where he became an Associate Professor in 1994 and a Full Professor in 1997. He has authored or co-authored more than 400 journal articles, six research monographs, and 20 edited books. His current research interests include hybrid dynamical systems, multi-agent systems, complex dynamical networks, and infectious disease modeling.

09:40 AM - 10:35 AM

## Plenary Lecture

### SESSION CHAIR:

Dr. Aparicio Carranza, New York City College of Technology, USA



## Spiking Control Systems

### *Dr. Rodolphe Sepulchre*

University of Cambridge, UK

Rodolphe Sepulchre received the engineering degree (1990) and the PhD degree (1994), both from the Université catholique de Louvain, Belgium. He was a postdoctoral research associate at the University of California, Santa Barbara, from 1994 to 1996. He was then appointed at the Université de Liège in 1997. In 2013, he moved to Cambridge, UK, where he holds the control chair in the Department of Engineering and a professional fellowship in Sidney Sussex College. He held visiting positions at Princeton University (2002-2003), the Ecole des Mines de Paris (2009-2010), California Institute of Technology (2018), and part-time positions at the University of Louvain (2000-2011) and at INRIA Lille Europe (2012-2013). He was the Petar Kokotovic Distinguished Visiting Professor of UCSB in 2019.

He is a fellow of IFAC (2020), IEEE (2009), and SIAM (2015). In 2008, he received the IEEE Control Systems Society Antonio Ruberti Young Researcher Prize. He was elected at the Royal Academy of Belgium in 2013. He is the recipient of the 2020 IEEE Axelby Best Paper Award. He is (co-) author of the monographs *Constructive Nonlinear Control* (1997, with M. Jankovic and P. Kokotovic) and *Optimization on Matrix Manifolds* (2008, with P.-A. Absil and R. Mahony). His current research interests include the differential theory of nonlinear systems and the feedback control principles of neuronal circuits. His research is currently funded by the ERC advanced grant *Switchlets* (2015-2021). He is Editor-in-Chief of the *IEEE Control Systems Magazine* since 2020.

10:35 AM - 10:55 AM COFFEE BREAK

## Keynote Lecture

10:55 AM - 11:40 AM

### SESSION CHAIR:

Dr. Aparicio Carranza, New York City College of Technology, USA



## Magnetic Levitation for Microrobotics and Micromanipulation

*Dr. Behrad Khamesee,  
University of Waterloo, Canada*

Dr. Behrad Khamesee is a Professor in the Department of Mechanical and Mechatronics Engineering, University of Waterloo, Canada. He is the director of MagLev Microrobotics Laboratory and co-PI of the RoboHub state-of-the-art robotics facility at the University of Waterloo. His research interests and expertise include design, modeling, and control of advanced mechatronics systems, particularly microrobotic magnetic levitation and semi-active electromagnetic dampers for vehicles.

His research has resulted in 90 refereed Journal and conference papers, and his research group is a recipient of several best paper awards. His research group developed the world's smallest magnetically-levitated microrobot which is equipped with a gripper. Dr. Khamesee is involved in conferences program committees, has organized several sessions at international conferences, and is a technical reviewer for several IEEE Journals.

### MORNING SESSION - ROOM 1

## Robotics I

11:40 AM - 12:40 AM

**SESSION CHAIR:** Dr. Aparicio Carranza, New York City College of Technology, USA & Dr. Behrad Khamesee, University of Waterloo, Canada

CDSR 129  
11:40 - 11:55

### Leader-Follower Formation with Second-Order Slide Mode Control for Differential-Drive Mobile Robots

*Mario Ramirez-Neria, Universidad Iberoamericana Ciudad de México, México*

**Authors:** Mario Ramirez-Neria, Jaime González-Sierra, Eduardo G. Martínez-Hernández Rodrigo Ramirez-Juarez and Pablo Paniagua-Contro

CDSR 111  
11:55 - 12:10 **Effects of the Link Lengths in the Design and Optimization of A 6 DOF Assistive Robot for Activities of Daily Living**

*Elias Muñoz, University of Wisconsin-Milwaukee, USA*

*Authors:* Elias Muñoz, Md Samiul Haque Sunny, Javier Sanjuan, Ivan Rulik, Jaime Hernandez, Inga Wang, Mohammad H. Rahman

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CDSR 112  
12:10 - 12:25 **A Vision-based Object Detection and Localization System in 3D Environment for Assistive Robots' Manipulation**

*Md Ishrak Islam Zarif, Marquette University, USA*

*Authors:* Md Ishrak Islam Zarif, Md Tanzil Shahria, Md Samiul Haque Sunny, Md Mahafuzur Rahaman Khan, Sheikh Iqbal Ahamed, Inga Wang, Mohammad H Rahman

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CDSR 108  
12:25 - 12:40 **Optimal Design of a Cable-driven Wrist Prosthetic Device**

*J.D. Sanjuan, University of Wisconsin-Milwaukee, USA*

*Authors:* J.D. Sanjuan, Md Samiul Haque Sunny, Jawher Ghommam, Brahim Brahmi, Inga Wang, Mohammad H. Rahman

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CDSR 130  
12:40 - 12:45 **Robotics and Virtual Reality to Improve Functional Recovery in Stroke Patients**

*Carlos Omar López-López, Universidad Iberoamericana Ciudad de México, México*

*Authors:* Carlos Omar López-López, Mario Ramirez-Neria, Pablo Paniagua-Contro, Isabel Bolivar-Tellería, Carlos Galvan-Duque, Eduardo G. Hernandez-Martinez

12:45 PM - 12:50 PM **GROUP PHOTO**

12:50 PM - 01:45 PM **LUNCH - NIAGARA WEST**

PLENARY SESSION

## Plenary Lecture

01:45 PM - 02:40 PM

SESSION CHAIR:

Dr. Aparicio Carranza, New York City College of Technology, USA



## Neuro-dynamics based Intelligent Control of Various Autonomous Robotic Systems

*Dr. Simon Yang,  
University of Guelph, Canada*

Prof. Simon X. Yang received the B.Sc. degree in engineering physics from Beijing University, China in 1987, the first of two M.Sc. degrees in biophysics from Chinese Academy of Sciences, Beijing, China in 1990, the second M.Sc. degree in electrical engineering from the University of Houston, USA in 1996, and the Ph.D. degree in electrical and computer engineering from the University of Alberta, Edmonton, Canada in 1999. Prof. Yang joined the School of Engineering at the University of Guelph, Canada in 1999. Currently he is a Professor and the Head of the Advanced Robotics and Intelligent Systems (ARIS) Laboratory at the University of Guelph in Canada.

Prof. Yang has diversified research expertise. His research interests include robotics, artificial intelligence, sensors and multi-sensor fusion, wireless sensor networks, intelligent control, machine learning, fuzzy systems, intelligent communication and transportation, and computational neuroscience. Prof. Yang he has been very active in various professional activities. He serves as the Editor-in-Chief of International Journal of Robotics and Automation, and an Associate Editor of IEEE Transactions on Cybernetics, IEEE Transactions of Artificial Intelligence, and several other journals. He has involved in the organization of many international conferences.

## AFTERNOON SESSION

**Control System and Application**

02:40 PM - 04:10 PM

**SESSION CHAIR:** Dr. Mario Ramirez-Neria, Universidad Iberoamericana Ciudad de Mexico, Mexico

CDSR 109

**Magnetic Drive-Trains Pole-Slipping Inducements and Overload Speed Reduction**

02:40 - 02:55

*Chris Bingham, University of Lincoln, UK*

*Authors:* Xiaowen Liao, Chris Bingham, Tim Smith

CDSR 106

**A Model-Free Control System Based on the Sliding Mode Control with Automatic Tuning Using as On-Line Parameter Estimation Approach**

02:55 - 03:10

*Ms. Agamemnon Crassidis, 4Rochester Institute of Technology, USA*

*Authors:* Md Sariful Islam, Agamemnon Crassidis, Daniel Kaputa, Aashrita Mandalapu

CDSR 119

**An Improvement in Efficiency of Non-Conventional Energy Resources Using Green Computing**

03:10 - 03:25

*Ranjeet Singh, GTB Khalsa Polytechnic College, India*

*Authors:* Ranjeet Singh

CDSR 126

**Raspberry Pi and White Cane Integration for Assisting the Visually Impaired**

03:25 - 03:40

*Aparicio Carranza, New York City College of Technology, USA*

*Authors:* Aparicio Carranza, Anny Baez, Josue Hernandez, Harrison Carranza, Hossein Rahemi

CDSR 128

**Scaled Consensus Of Hybrid Multi-Agent Systems**

03:40 - 03:55

*Mana Donganont, University of Waterloo, Canada*

*Authors:* Mana Donganont, Xinzhi Liu

CDSR 117

**Nonlinear State Estimation and Control of an Organic Rankine Cycle**

03:55 - 04:10

*Daniel Sieben, University of Calgary*

*Authors:* Daniel Sieben, Jeff Pieper

04:10 PM - 04:30 PM

COFFEE BREAK

KEYNOTE SESSION

8:30 AM - 9:15 AM

## Keynote Lecture

SESSION CHAIR:

Dr. Aparicio Carranza, New York City College of Technology, USA



## Unleash the Combined Power of Physics and Machine Learning for Advanced Battery Management

*Dr. Huazhen Fang,  
University of Kansas, USA*

Huazhen Fang is an Associate Professor of Mechanical Engineering at the University of Kansas, where he joined in 2014 and has led the Information & Smart Systems Laboratory. He received his Ph.D., M.Sc., and B.Eng. from the University of California, San Diego (Mechanical Engineering, 2014), University of Saskatchewan, Canada (Mechanical Engineering, 2009), and Northwestern Polytechnic University, China (Computer Science, 2006), respectively. His research interests lie in modeling, control and estimation theory with application to energy management and cooperative robotics. He has received the 2019 National Science Foundation Faculty Early Career Award. He currently serve as an Associate Editor for Information Sciences, IEEE Transactions on Industrial Electronics, IEEE Open Journal of Control Systems, IEEE Open Journal of the Industrial Electronics Society, and on the IEEE Control Systems Society Conference Editorial Board.

PLENARY SESSION

9:15 AM - 10:10 AM

## Plenary Lecture

SESSION CHAIR:

Dr. Aparicio Carranza, New York City College of Technology, USA



## Universal Laws and Architectures and Their Fragilities

*Dr. John Doyle,  
California Institute of Technology, USA*

John Doyle is the Jean-Lou Chameau Professor of Control and Dynamical Systems, Electrical Engineer, and BioEngineering at Caltech, and received the BS&MS in EE, MIT (1977), and PhD in Math, UC Berkeley (1984)). He was a consultant at Honeywell Systems and Research Center from 1976 to 1990. Research is on mathematical foundations for complex networks with applications in biology, technology, medicine, ecology, neuroscience, and multiscale physics that integrates theory from control, computation, communication, optimization, statistics (e.g. Machine Learning).

10:10 AM - 10:30 AM COFFEE BREAK

PLENARY SESSION

10:30 AM - 11:25 AM

## Plenary Lecture

SESSION CHAIR:

Dr. Aparicio Carranza, New York City College of Technology, USA



## Analytics-Driven Cyber-Physical Security for a Converged Smart Grid

*Dr. Deepa Kundur,  
University of Toronto, Canada*

Deepa Kundur is Professor & Chair of The Edward S. Rogers Sr. Department of Electrical & Computer Engineering at the University of Toronto. A native of Toronto, Canada, she received the B.A.Sc., M.A.Sc., and Ph.D. degrees all in Electrical and Computer Engineering in 1993, 1995, and 1999, respectively, from the University of Toronto. Professor Kundur's research interests lie at the interface of cybersecurity, signal processing and complex dynamical networks. She is an author of over 200 journal and conference papers and is also a recognized authority on cyber security issues. She has served in numerous conference executive organization roles, and has participated on several editorial boards and federal government funding panels. She currently serves on the Advisory Board of IEEE Spectrum. Professor Kundur's research has received best paper recognitions at numerous venues including the 2015 IEEE Smart Grid Communications Conference, the 2015 IEEE Electrical Power and Energy Conference, the 2012 IEEE Canadian Conference on Electrical & Computer Engineering, the 2011 Cyber Security and Information Intelligence Research Workshop and the 2008 IEEE INFOCOM Workshop on Mission Critical Networks. She is a Fellow of the IEEE, a Fellow of the Canadian Academy of Engineering, and a Senior Fellow of Massey College.

MORNING SESSION

**Robotics II**

11:25 AM - 12:15 PM

**SESSION CHAIR:** Dr. Mario Ramirez-Neria, Universidad Iberoamericana Ciudad de Mexico, Mexico

CDSR 110

**A Self-Driving Transport Vehicle Based on Fusion Camera and Radar**

11:25 - 11:30

*Muhieddin Amer, Rochester Institute of Technology Dubai, UAE*

*Authors:* Jinane Mounsef, Muhieddin Amer

CDSR 124

**Battery Energy Maximization of a Solar Powered Unmanned Ground Vehicle in an Unknown Environment**

11:30 - 11:45

*Luke Strebe, New Mexico Tech, USA*

*Authors:* Luke Strebe, Kooktae Lee

CDSR 122

**Optimal Gas Leak Localization and Detection using an Autonomous Mobile Robot**

11:45 - 12:00

*Geronimo Macias,, New Mexico Institute of Mining and Technology, USA*

*Authors:* Geronimo Macias, Kooktae Lee

CDSR 107

**A New Compound Model-based Control (NCCM) of an Upper Limb Robot for Rehabilitation**

12:00 - 12:15

*Md Rasedul Islam, University of Wisconsin-Green Bay, USA*

*Authors:* Md Rasedul Islam, Mohammad Habibur Rahman

## AFTERNOON SESSION

### Modeling of Complex Systems

12:15 PM - 01:00 PM

**SESSION CHAIR:** Dr. Mario Ramirez-Neria, Universidad Iberoamericana Ciudad de Mexico, Mexico

CDSR 123

#### Continuous Appropriately-Oriented Collision Detection Algorithm for Physics-Based Simulations

12:15 - 12:30

*Alexander Schock, Carleton University, Canada*

*Authors:* Alexander Schock, Robert Langlois

CDSR 125

#### Dynamic Modelling of the Standard Neonatal Patient Transport System using a Newton-Euler Based Formulation in the Roll Plane

12:30 - 12:45

*Keely Gibb, Carleton University, Canada*

*Authors:* Keely Gibb, Patrick Kehoe, Jason Hurley, Cheryl Aubertin, Kim Greenwood, Andrew Ibey, Stephanie Redpath, Adrian D. C. Chan, James R. Green, Robert G. Langlois

CDSR 180

#### Design of a Sensorless Field Oriented Control Drive for Brushless DC Motors

12:45 - 01:00

*Chemil Abeykoon, University of Peradeniya, Sri Lanka*

*Authors:* Shanthar Rajinth, Chamil Abeykoon, Sanjeeva Maithripala

01:00 PM - 02:00 PM

LUNCH - NIAGARA WEST

8:00 PM - 10:00 PM

BANQUET DINNER - NIAGARA WEST



# THE 10<sup>th</sup> INTERNATIONAL CONFERENCE ON CONTROL DYNAMIC SYSTEMS AND ROBOTICS

JUNE 01 - 03, 2023 | Canada

Next year, the Conference will be held  
on June 01 - 03, 2023 in Canada

Please visit the website provided  
below for regular updates:

**[www.cdsr.net](http://www.cdsr.net)**

For inquiries and to obtain further information  
on the Conference please email us at:

**[info@cdsr.net](mailto:info@cdsr.net)**

or calls us

**+1-613-843-9999**

# NOTES

## JOURNALS PUBLICATIONS

Selected articles from the conference are welcomed to submit for publication to the following journal after a secondary review process:

- Journal of Machine Intelligence and Data Science (JMIDS)

JMIDS has adopted to the open-access model, meaning all free access to the journal's articles and content with no need for subscription. This ensures a larger audience and therefore higher citations.

Users are allowed to read, download, copy, distribute, print, search, or link to the full texts of the articles in this journal without asking prior permission from the publisher or the author. This is in accordance with the BOAI definition of open access.

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