

IEEE INTERNATIONAL SYMPOSIUM ON

ROSE 2019

ROBOTIC AND SENSORS ENVIRONMENTS



2019 SYMPOSIUM PROGRAM

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Message from the Chairpersons

On behalf of the organizing committee, it is our great pleasure to welcome all the participants to the 2019 IEEE International Symposium on Robotic and Sensors Environments (ROSE), held at the University of Ottawa, at the heart of the Canadian capital, Ottawa, on June 17-18, 2019.

ROSE 2019 is the 13th edition of this international symposium. Over the years, it has been organized in several European and North American cities. This year, we are delighted to host it back here in Ottawa, one of the most beautiful cities in Canada, especially this time of the year. Ottawa is a culturally vibrant city known for its 10-day tulip festival and the large variety of museums. The University of Ottawa's main campus is in the core downtown area, minutes away from numerous landmarks, such as the Parliament Hill (Canadian parliament), the internationally-renowned Rideau Canal, UNESCO World Heritage Site, and the ByWard Market.

The IEEE ROSE Symposium is sponsored by the Institute of Electrical and Electronic Engineers (IEEE) Instrumentation and Measurement Society (IMS). The symposium is also technically co-sponsored by the IEEE Ottawa Chapters for Instrumentation and Measurement Society (IMS), Robotics and Automation Society (RAS), Control Systems Society (CSS), Computational Intelligence Society (CIS), and Systems, Man & Cybernetics Society (SMCS).

The symposium covers a wide spectrum of sensing systems and technologies for robotics and industrial automation, as well as their impact on autonomous robotics and intelligent systems development and applications. Over two days, participants will have plenty of opportunities to present their research, exchange technical insights with their peers, network, and explore new research directions as well as future collaborations with researchers around the world.

For this edition, over 40 manuscripts originating from 15 different countries were submitted and carefully peer-reviewed by a diversified committee of experts in all areas of robotic and sensor technologies. At the symposium, 30 papers of excellent quality will be presented orally, providing optimal opportunities to initiate discussion among the participants. The technical program nicely articulates around dominant areas of interest in the field, from fundamental control theory, to a variety of practical applications, and up to consideration of the impact of robots and intelligent systems in society. To further explore the potential of robots in everyday life, the symposium will open with the presentation from our guest speaker, Dr. Fakhri Karray, University Research Chair and Loblaw's Research Chair in Artificial Intelligence at the University of Waterloo. In his much-awaited presentation, he will expose his views about the quest for intelligent mobility with autonomous robots on wheels.

The organizing committee wants to acknowledge and emphasize the efforts of numerous contributors to the success of the conference. In particular, we would like to thank the technical program committee members who volunteered their time to carefully review the manuscripts and provide constructive comments to authors.

Our appreciation also goes to the Faculty of Engineering at the University of Ottawa for their logistic and financial support to host the conference on campus. We would like to extend our gratitude to our sponsors and technical sponsors for their support and generosity. We are immensely grateful to the volunteers whose tireless efforts have made the conference possible. Special thanks also go to the IEEE Instrumentation and Measurement Society which constantly provides its support and sponsorship to the ROSE conference series, and to Laura LeBlanc and Chris Dyer from Conference Catalysts for their consistent and thorough assistance to the organization.

Finally, we would like to also thank all the authors and participants who submitted manuscripts of excellent quality to ROSE and directly contributed to the success of this conference.

We wish all the participants a pleasant and fruitful experience, and we hope that you enjoy the unique atmosphere of Ottawa.

General Co-Chairs	Christian Claudel, University of Texas, Austin, USA Wail Gueaieb, University of Ottawa, Canada
Technical Program Co-Chairs	Pierre Payeur, University of Ottawa, Canada Sebastian Zug, TU Bergakademie Freiberg, Germany

IEEE ROSE 2019 Organizers

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Christian Claudel
University of Texas, Austin, USA

Wail Gueaieb
University of Ottawa, Canada

Technical Program Co-Chairs

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University of Ottawa, Canada

Sebastian Zug
Technische Universität Bergakademie Freiberg, Germany

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IEEE ROSE 2019 Keynote Speaker



Fakhri Karray, PhD, P.Eng, FEIC,FCAE

University Research Chair Professor in Electrical and Computer Engineering and co-director of the Institute of Artificial Intelligence
University of Waterloo

Autonomous Robots on Wheels: The Quest for Intelligent Mobility

Abstract: “Intelligent/Smart Mobility” represents a corner stone and an integral part of the “Smart City Concept”. This is a major technological development where latest tools of artificial intelligence (AI) and communication systems are used towards the design of new generation of autonomous vehicles (machines/robots on wheels). These are fast becoming the roaring engines of advanced mobility systems (intelligent mobility: IM). The main purpose of IM is the design of more efficient, more intelligent, and safer transportation systems that are better suited and more adapted to the latest advances in information and communication technologies, including 5G networks and smart sensory systems connected to the Internet (Internet of things: IoT). It is expected that most modes of transportation will become soon connected to the cloud and to the ever expanding IoT infrastructure. With more than a billion vehicles on the roads today, a number expected to increase by 250% in 2050, the design of highly efficient and safer transportation systems is becoming a necessity. This is a major challenge for car manufacturers, road infrastructure planners, and transportation policy makers. For instance, it is well accepted, that building more roads and related conventional transportation infrastructure will not resolve by itself, the ever-increasing traffic congestion problems. The talk highlights newly developed technologies allowing for the design of next generation autonomous vehicles and smart mobility systems. These enabling technologies represent the core of the smart mobility concept and have become prevalent thanks to spectacular advances made in the fields of machine intelligence, smart devices, sensor networks, big data analytics and Internet of things. They allow for the design of more intelligent vehicles (L3 and L4 generations), permit safer travel journeys and enable the design of more effective and smarter transportation networks, while significantly reducing traffic congestion, road fatalities and injuries, fuel consumption and pollution. The talk outlines as well recent achievements in the field and highlights challenges toward achieving short and long-term goals of building more livable and more sustainable cities of the future.

Biography: Fakhri Karray is the University Research Chair Professor in Electrical and Computer Engineering and co-director of the Institute of Artificial Intelligence at the University of Waterloo. He is also the director of the University's Center for Pattern Analysis and Machine Intelligence and holds the Loblaw's Research Chair in Artificial Intelligence.

Dr. Karray's research work spans the areas of intelligent systems and operational artificial intelligence as applied to smart machines/devices and man-machine interaction systems. He has authored extensively in these areas and has disseminated his work in journals, conference proceedings, and textbooks. He is the co-author of two dozen US patents, has chaired/co-chaired several international conferences in his area of expertise and has served as keynote/plenary speaker on numerous occasions. He has also served as the associate editor/guest editor for numerous journals, including the IEEE Transactions on Cybernetics, the IEEE Transactions on Neural Networks and Learning Systems, the IEEE Transactions on Mechatronics, the IEEE Computational Intelligence Magazine. His work has been featured on Discovery Channel, CBC, Globe and Mail, The Record, Reuters, the Daily Mail, Washington Post, Wired Magazine, and DigitalTrends portals. He has served as the University of Waterloo's Academic Advisor for Amazon's Alexa Fund Fellowship Program and is a Fellow of the Canadian Academy of Engineering and a Fellow of the Engineering Institute of Canada

Technical Program: Monday, June 17, 2019

All sessions will take place on the main floor of the SITE Building (800 King Edward Avenue) in room STE A0150.

8:00 - 9:00

Registration

9:00 - 9:15

Welcome Word

9:15 - 10:15

Session 1 - Guest Speaker

Dr. Fakhri Karray, University of Waterloo, ON, Canada

10:15 - 10:45

Coffee break

10:45 - 12:05

Session 2 - Path Planning and Robot Navigation

Session Chair: Emil M. Petriu (University of Ottawa, Canada)

10:45

Navigation data imputation with GPS pinning in compositional Kalman filter for IoT systems

Yuri Boiko (University of Ottawa, Canada)

Ci Lin (University of Ottawa, Canada)

Iluju Kiringa (University of Ottawa, Canada)

Tet Yeap (University of Ottawa, Canada)

11:05

The use of different feedback modalities and verbal collaboration in tele-robotic assistance

Joseph Oluwatobiloba Bolarinwa (University of the West of England, United Kingdom (Great Britain))

Iveta Eimontaite (University of the West of England, United Kingdom (Great Britain))

Sanja Dogramadzi (University of the West of England, United Kingdom (Great Britain))

Tom Mitchell (University of the West of England, United Kingdom (Great Britain))

Praminda Caleb-Solly (University of the West of England, United Kingdom (Great Britain))

11:25

Zero visibility autonomous landing of quadrotors on underway ships in a sea state

Jordan Ross (Dalhousie University, Canada)

Mae Seto (Dalhousie University, Canada)

Clifton Johnston (Dalhousie University, Canada)

11:45

Exploiting OpenStreetMap-Data for Outdoor Robotic Applications

Oleksii Bashkanov (Otto-von-Guericke Universität, Germany)

Martin Seidel (Otto-von-Guericke Universität, Germany)

Maksym Yakymets (Faculty of Computer Science Otto-von-Guericke Universität, Germany)

Nursultan Daupayev (Faculty of Computer Science Otto-von-Guericke Universität Germany, Germany)

Yevhen Sharonov (Faculty of Computer Science Otto-von-Guericke Universität, Germany)

Tom Assmann (Otto-von-Guericke Universität, Germany)

Stephan Schmidt (IMS OVGU, Germany)

Sebastian Zug (Technische Universität Bergakademie Freiberg, Germany)

12:05 - 13:15

Lunch (provided)

13:15 - 15:15

Session 3 - Unmanned Systems and Collaborative Robots

Session Chair: Sebastian Zug (Technische Universität Bergakademie Freiberg, Germany)

13:15

Robotic Swarm Dispersion Using Gradient Descent Algorithm

Jonathan Bayert (Valparaiso University, USA)

Sami Khorbotly (Valparaiso University, USA)

13:35

Analysis of Automatic through Autonomous - Unmanned Ground Vehicles (A-UGVs) Towards Performance Standards

Soocheol Yoon (National Institute of Standards and Technology, USA)

Roger Bostelman (National Institute of Standards and Technology, USA)

13:55

Probabilistic Task Assignment for Specialized Multi-Agent Robotic Systems

Omar Al-Buraiki (University of Ottawa, Canada)

Pierre Payeur (University of Ottawa, Canada)

14:15

Collaboration of multi-domain marine robots towards above and below-water characterization of floating targets

Jordan Ross (Dalhousie University, Canada)

Joel Lindsay (Dalhousie University, Canada)

Edward Gregson (Dalhousie University, Canada)

Alexander Moore (Dalhousie University, Canada)

Jay C Patel (Dalhousie University, Canada)

Mae Seto (Dalhousie University, Canada)

14:35

Task Allocation for Heterogeneous Robots Using a Self-Organizing Contextual Map

Matt Ross (University of Ottawa, Canada)

Pierre Payeur (University of Ottawa, Canada)

Sylvain Chartier (University of Ottawa, Canada)

14:55

An Integrated Task and Motion Planning Technique for Multi-Robot-Systems

Ilknur Umay (University of Waterloo, Canada)

William Melek (University of Waterloo)

Baris Fidan (University of Waterloo, Canada)

15:15 - 15:45

Coffee Break

15:45 - 17:25

Session 4 - Robot Control Systems

Session Chair: Sami Khorbotly (Valparaíso University, USA)

15:45

An Online Reinforcement Learning Wing-Tracking Mechanism for Flexible Wing Aircraft

Mohammad Abouheaf (University of Ottawa, Canada)

Nathaniel Q Mailhot (University of Ottawa, Canada)

Wail Gueaieb (University of Ottawa, Canada)

16:05

Adaptive Sliding Mode Control Based on RBF Neural Network Approximation for Quadrotor

Walid Alqaisi (University of Quebec, Canada)

Brahim Brahmi (École de Technologie Supérieure, Canada)

Jawhar Ghommam (Department of Electrical and Computer Engineering, Sultan Quaboos University, Muscat, Oman)

Maarouf Saad (University of Quebec, Canada)

Vahe Nerguizian (ETSMTL, Canada)

16:25

Model-Free Adaptive Control Approach Using Integral Reinforcement Learning

Mohammad Abouheaf (University of Ottawa, Canada)

Wail Gueaieb (University of Ottawa, Canada)

16:45

Non-autonomous State-Feedback to Stabilize the Error Dynamics in Time-Varying Area Coverage Control Problems

Farzan Soleymani (University of Ottawa & NRC, Canada)

Davide Spinello (University of Ottawa, Canada)

Md Suruz Miah (Bradley University, USA)

17:05

Neurofuzzy Reinforcement Learning Control Schemes for Optimized Dynamical Performance

Mohammad Abouheaf (University of Ottawa, Canada)

Wail Gueaieb (University of Ottawa, Canada)

18:30 - 20:30

Conference Dinner: Johnny Farina Restaurant

216 Elgin Street, Ottawa, ON K2P 1L6

Technical Program: Tuesday, June 18, 2019

All sessions will take place on the main floor of the SITE Building (800 King Edward Avenue) in room STE A0150.

8:30 - 9:00

Registration

9:00 - 10:20

Session 5 - Distributed Sensor and Robot Networks

Session Chair: Davide Spinello (University of Ottawa, Canada)

9:00

Intelligent Sensing for Automated Spectrum Assignment

David Kidston (Communications Research Centre, Canada)

Maoyu Wang (Communications Research Centre, Canada)

9:20

Impact of Sensor Network Topology on Acoustic Communications for Protecting Marine Mammals

Stephane Blouin (DRDC, Canada)

9:40

Machine Learning Based Adaptive Link Quality Prediction for Robot Network in Dynamic Environment

Olusiji O Medaiyese (University of Louisville, USA)

Adrian Lauf (University of Louisville, USA)

10:00

Sandboxing for Cross-Platform Applications of Robots

Saba Mylvaganam (University of South-Eastern Norway, Norway)

10:20 - 10:50

Coffee Break

10:50 - 12:10

Session 6 - Intelligent Sensing and Robotics in Society

Session Chair: Stephane Blouin (DRDC, Canada)

10:50

A Bayesian System for Noise-Robust Binaural Sound Localisation for Humanoid Robots

Austin Kothig (University of Lethbridge, Canada)

Marko Ilievski (University of Waterloo, Canada)

Lukas Grasse (University of Lethbridge, Canada)

Francesco Rea (Italian Institute of Technology, Italy)

Matthew Tata (University of Lethbridge, Canada)

11:10

Preliminary Study of a Novel Magnetic Sensor for Safety in Industrial Robotics

Alfredo De Leo (Università Politecnica dell Marche, Italy)

David Scaradozzi (Università Politecnica delle Marche, Italy)

Riccardo Genovesi (Università Politecnica dell Marche, Italy)

Graziano Cerri and Giuseppe Conte (Università Politecnica delle Marche, Italy)

Anna Maria Perdon (Università Politecnica dell Marche, Italy)

Edin Omerdic (Unuversity of Limerick, Ireland)

11:30

A Framework for Collision Prediction Using Historical Accident Information and Real-time Sensor Data: A Case Study for the City of Ottawa

Enrique A Reveron (Carleton University, Canada)

Ana-Maria Cretu (Carleton University, Canada)

11:50

Robot Rights in the Era of Robolution and the Acceptance of Robots from the Slovak Citizen's Perspective

Michal Beno (VSM/CITY University of Seattle Slovakia, Austria)

12:10 - 13:30

Lunch (provided)

13:30 - 14:50

Session 7 - Robotic Manipulation

Session Chair: Wail Gueaieb (University of Ottawa, Canada)

13:30

Displacement-based Model for Estimation of Contact Force Between RFA Catheter and Atrial Tissue with ex-vivo Validation

Mohammad Jolaei (Concordia University, Canada)

Amir Hooshier (Concordia University, Canada)

Javad Dargahi (Concordia University, Canada)

13:50

Evolving Fuzzy Models for Prosthetic Hand Myoelectric-based Control Using Weighted Recursive Least Squares Algorithm for Identification

Radu-Emil Precup (Politehnica University of Timisoara, Romania)

Adrian Teban (Politehnica University of Timisoara, Romania)

Adriana Albu (Politehnica University of Timisoara, Romania)

Alexandra-Bianca Borlea (Politehnica University of Timisoara, Romania)

Iuliu Alexandru Zamfirache (Politehnica University of Timisoara, Romania)

Emil M. Petriu (University of Ottawa, Canada)

14:10

Automatic Selection of Grasping Points for Shape Control of Non-Rigid Objects

Félix Nadon (University of Ottawa, Canada)

Pierre Payeur (University of Ottawa, Canada)

14:30

End-Effector Approach Flexibilization in a Surface Approximation Task Using a Bioinspired Tactile Sensing Module

Thiago Eustaquio Alves de Oliveira (University of Ottawa, Canada)

Vinicius Prado da Fonseca (University of Ottawa, Canada)

Bruno Monteiro Rocha Lima (University of Ottawa, Canada)

Ana-Maria Cretu (Carleton University, Canada)

Emil M. Petriu (University of Ottawa, Canada)

14:50 - 15:20

Coffee Break

15:20 - 16:20

Session 8 - Robot Vision and Imaging

Session Chair: Pierre Payeur (University of Ottawa, Canada)

15:20

Reducing Localization Error of Vision-Guided Industrial Robots

Marek Franaszek (National Institute of Standards and Technology, USA)

Geraldine Cheok (National Institute of Standards and Technology, USA)

Jeremy Marvel (National Institute of Standards and Technology, USA)

15:40

Comparative Analysis of Image Fusion Methods in Marine Environment

Fahimeh Farahnakian (University of Turku, Finland)

Parisa Movahedi (University of Turku, Finland)

Jussi Poikonen (Kongsberg Maritime Oy, Finland)

Eero Lehtonen (Kongsberg Maritime Oy, Finland)

Dimitrios Makris (Kingston University, United Kingdom (Great Britain))

Jukka Heikkonen (University of Turku, Finland)

16:00

A Novel Real-time Driver Monitoring System Based on Deep Convolutional Neural Networks

Yiheng Zhao (University of Ottawa, Canada)

Abdelhamid Mammeri (University of Ottawa, Canada)

Azzedine Boukerche (University of Ottawa, Canada)

16:20 - 16:45

Best Paper Award and Closing Remarks

Free WiFi will be available through "eduroam" for attendees who have this service at their academic institutions.

NOTES

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.