IEEE

ROSE 2026

IEEE INTERNATIONAL SYMPOSIUM ON ROBOTIC AND SENSORS ENVIRONMENTS

May 18-19, 2026 || Norfolk, VA, USA

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SYMPOSIUM PROGRAM

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Message from the General Chair

Prof. Hicham Chaoui
Batten Endowed Chair & Inaugural Director of the
Institute for Autonomous and Connected Systems
Old Dominion University
Norfolk, VA

Dear Colleagues and Participants,

It is with great enthusiasm and pleasure that I welcome you to the 2026 IEEE International Symposium on Robotic and Sensor Environments (ROSE). As the General Chair, I am delighted to host this distinguished gathering, bringing together researchers, practitioners, and innovators from around the world for a rich exchange of ideas and collaboration.

IEEE ROSE 2026 provides a vibrant platform to present cutting-edge research, explore emerging trends in robotics and sensor systems, and foster meaningful connections within our interdisciplinary community. Whether you are a long-standing contributor or new to the field, your participation plays an essential role in advancing dialogue and shaping the future of intelligent environments.

This year's symposium continues the proud tradition of ROSE in advancing technologies at the intersection of robotics, sensing, and real-world applications. As I reflect on the progress of our field, I recognize the vision and dedication of those who have contributed to its growth and impact. Their efforts have helped build a global community committed to innovation and to improving lives through technology.

The success and continued relevance of ROSE are made possible by the commitment of our members, volunteers, partners, and supporters. I extend my sincere appreciation to all of you for your invaluable contributions and ongoing engagement.

Our organizing committee has assembled an exciting and diverse program, including technical sessions, workshops, and keynote talks by leading experts who will share insights into the latest advancements and future directions in robotics and sensor environments.

I am especially grateful to our sponsors, speakers, volunteers, attendees, and the ROSE Steering Committee for their support and dedication in making this event possible.

As we begin this inspiring symposium, I wish you a productive, engaging, and memorable experience.

Welcome to ROSE 2026.

Warmest regards,

Prof. Hicham Chaoui
General Chair, IEEE ROSE 2026

IEEE ROSE 2026 Organizers

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Hicham Chaoui
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IEEE ROSE 2026 Conference Sponsors

IEEE ROSE 2026 Keynote Speakers

Gregory Hager
Johns Hopkins University, USA

AI for the Physical World: Sensing Not Optional

Abstract: Recent advances in AI have initiated transformative changes in many areas of non-physical work. However, what do these advances imply for agents that operate in the physical world? Will current approaches to developing AI-based systems provide meaningful advances toward General Physical Intelligence (GPI) – namely the ability to quickly understand, robustly plan for, and efficiently execute novel physical tasks?

In this talk, I will offer a perspective on the path toward GPI, with a focus on identifying some of the gaps that stand in the way of real-world practical systems. Some of these gaps stem from today's data-intensive recipe for AI, but closely related are limitations in terms of both physical embodiment and physical sensing. I will ground these perspectives with examples emerging in the field of sensor-based robotics as well as results achieved by myself and my colleagues in understanding and developing systems that perform complex tasks such as surgery. Along the way, I will offer some perspectives how future advances toward general physical intelligence might be achieved through the combined efforts of academia, industry, and government support.

Biography: Gregory D. Hager is the Mandell Bellmore Professor of Computer Science at Johns Hopkins University where his is Director of the Laboratory for Computational Sensing and Robotics. Professor Hager's research interests include collaborative and vision-based robotics, time-series analysis of image data, and medical applications of image analysis and robotics. Professor Hager previously led the Directorate for Computer and Information Science and Engineering at the National Science Foundation. Prior to that he led technology development groups for Amazon Just Walk Out Technology and Amazon Robotics. Professor Hager has also held a Hans Fischer Fellow at the Technical University of Munich and he has served as Chair of the Computing Community Consortium and is a member of the governing board of the International Federation of Robotics Research. Professor Hager is a fellow of the ACM, IEEE and AAAS for his contributions to Vision-Based Robotics and a Fellow of the MICCAI Society and of AIMBE for his contributions to computational imaging and his work on the analysis of surgical technical skill.

Kyriakos G. Vamvoudakis
Georgia Institute of Technology, USA

Toward Truly Intelligent Cyber-Physical Systems: Learning, Adaptation, and Strategic Autonomy

Abstract: Intelligent cyber-physical systems (CPS) are tightly integrated, heterogeneous systems that combine physical processes with computation, communication, and control. These systems rely on seamless interactions between analog and digital components, interconnected through communication networks that enable real time data exchange. Among the most critical elements of intelligent CPS are sensors and actuators, which directly influence system performance, efficiency, and adaptability. Sensors provide situational awareness by capturing data from the physical environment, while actuators enable the system to respond and steer its behavior toward desired objectives. To address the inherent cognitive and computational limitations of intelligent CPS, this talk introduces principles of bounded rationality for autonomous decision-making, leveraging tools from control theory and reinforcement learning. In particular, we develop level-k thinking and cognitive hierarchy frameworks within both nonlinear and linear noncooperative differential games, where agents are characterized by varying levels of reasoning depth. Building on this foundation, we present a meta-learning framework for multi-agent environments that enables advanced decision-making strategies. This framework allows autonomous agents not only to learn from their environment but also to anticipate, influence, and strategically respond to the learning behaviors of other agents, enabling capabilities such as adaptive coordination, strategic manipulation, and deception. Furthermore, we introduce data-driven methods for actuator and sensor selection in intelligent CPS, with a focus on enhancing system resiliency. Model-free, learning-based approaches are proposed to optimize key system properties, including controllability, observability, and robustness against adversarial disruptions. These methods leverage reinforcement learning to dynamically select sensing and actuation configurations using both state and output feedback in continuous- and discrete-time settings. The talk concludes with simulation studies on large-scale systems, demonstrating the effectiveness and scalability of the proposed frameworks in designing resilient, adaptive, and intelligent cyber physical systems.

Biography: Kyriakos G. Vamvoudakis was born in Athens, Greece. He earned his Diploma in Electronic and Computer Engineering (equivalent to a Master of Science) from the Technical University of Crete, Greece, in 2006, graduating with highest honors. After relocating to the United States, he pursued further studies at The University of Texas at Arlington under the guidance of Frank L. Lewis, obtaining his M.S. and Ph.D. in Electrical Engineering in 2008 and 2011, respectively. From May 2011 to January 2012, he served as an Adjunct Professor and Faculty Research Associate at the University of Texas at Arlington and the Automation and Robotics Research Institute. Between 2012 and 2016, he was a project research scientist at the Center for Control, Dynamical Systems, and Computation at the University of California, Santa Barbara. He then joined the Kevin T. Crofton Department of Aerospace and Ocean Engineering at Virginia Tech as an assistant professor, a position he held until 2018. He currently serves as the Dutton-Ducoffe Endowed Professor at The Daniel Guggenheim School of Aerospace Engineering at Georgia Tech. He holds a secondary appointment in the School of Electrical and Computer Engineering. His expertise is in reinforcement learning, control theory, game theory, cyber-physical security, bounded rationality, and safe/assured autonomy. He has received numerous prestigious honors, including the 2019 ARO YIP Award, the 2018 NSF CAREER Award, the 2018 DoD Minerva Research Initiative Award, and the 2021 Georgia Tech Chapter Sigma Xi Young Faculty Award. His research has also earned multiple best paper nominations and international recognitions, such as the 2016 International Neural Network Society (INNS) Young Investigator Award, a 2024 NASA Group Achievement Award, the Best Paper Award for Autonomous/Unmanned Vehicles at the 27th Army Science Conference (2010), the Best Presentation Award at the World Congress of Computational Intelligence (2010), and the Best Researcher Award from the Automation and Robotics Research Institute (2011). Dr. Vamvoudakis has actively contributed to the research community through service on numerous international program committees and by organizing special sessions, workshops, and tutorials at major international conferences. He is currently the Editor-in-Chief of Aerospace Science and Technology and serves on the IEEE Control Systems Society Conference Editorial Board. In addition, he is an Associate Editor for several leading journals, including Automatica, IEEE Transactions on Automatic Control, IEEE Transactions on Neural Networks and Learning Systems, IEEE Transactions on Systems, Man, and Cybernetics: Systems, IEEE Transactions on Artificial Intelligence, Neural Networks, IEEE Open Journal of the Computer Society, and the Journal of Optimization Theory and Applications. Previously, he has served as Guest Senior Editor for special issues of IEEE Transactions on Automation Science and Engineering, IEEE Transactions on Neural Networks and Learning Systems, IEEE Transactions on Industrial Informatics, IEEE Transactions on Intelligent Transportation Systems, and the IEEE Open Journal of Control Systems. Dr. Vamvoudakis is a registered Professional Engineer (Electrical/Computer Engineering), a member of the Technical Chamber of Greece, an Associate Fellow of AIAA, and a Senior Member of IEEE.

Technical Program: Monday, May 18, 2026

8:00 - 08:45
Registration

8:45 - 9:00
Opening Remarks

9:00 – 10:20
Session 1 – Perception and Collaborative Robotics
Room: ECSB 1202

9:00
Intelligent Sensing and Multisource Sensor Fusion for 3D Flood Exposure Modeling
Adil Khan (Old Dominion University, USA)

9:20
Agri-MoE: A Disturbance-Aware Mixture-of-Experts Framework for Robust Object Detection in Autonomous Agriculture
Silas Scholz (Ostfalia University of Applied Sciences, Germany)
Thomas Ochsner (Ostfalia University of Applied Sciences, Germany)
Harald Bachem (Ostfalia University of Applied Sciences, Germany)
Ludger Frerichs (Technische Universität Braunschweig, Germany)

9:40
Cognitive Fatigue-Aware Speed Selection for Human-Robot Collaboration
Ramya Bhaskar and Maria Kyrarini (Santa Clara University, USA)

10:00
Approach for Sensor Layout Generation in Human-Robot Collaboration Applications
Ibrahim Al Naser (IWU Fraunhofer, Germany)
Mohamad Bdiwi (Fraunhofer Institute for Machine Tools and Forming Technology IWU, Germany)
Steffen Ihlenfeldt (Fraunhofer Institute for Machine Tools and Forming Technology, Germany & Technische Universität Dresden, Chair of Machine Tools Development and Adaptive Controls, Germany)

10:20 – 10:55
Break

10:55 – 12:00
Keynote Speaker
Speaker: *Kyriakos G. Vamvoudakis (Georgia Institute of Technology, USA)*

12:00 – 13:00
Lunch

13:00 – 14:00
Workshop 1: AI-Aided Approaches for Autonomous Underwater Vehicle Navigation

14:00 – 15:30
Session 2 – Automation
Room: ECSB 1202

14:00
GPU-Accelerated Visuotactile Sensor Simulation for Sim-to-Real Transfer in Contact-Rich Robotic Manipulation
Ali Sayghe (Yanbu Industrial College, Saudi Arabia)

14:20
Assessing Procedural Content Generation in Reinforcement Learning Prompt-Based Feedback via Adaptive Virtual Reality Industrial Environments for Workforce Training
Joshua Hatfield (Marshall University, USA)
Husnu S Narman (Marshall University, USA)
Sudipta Chowdhury (Marshall University, USA)
Ammar Alzarrad (Marshall University, USA)

14:50
Scenario-Driven VR Training for Hydroelectric Performance Evaluation
Joshua Hatfield (Marshall University, USA)
Husnu S Narman (Marshall University, USA)
Sudipta Chowdhury (Marshall University, USA)
Ammar Alzarrad (Marshall University, USA)

15:10
AutoPCRS: An Automated System for Batch Photochemical Irradiation
Brandon Emmerich Collins (School of Engineering Bowling Green State University, USA)
Cameron Collins (School of Engineering Bowling Green State University, USA)
Mohammad Abouheaf (Bowling Green State University, USA)
Jayaraman Sivaguru (Bowling Green State University, USA)
Sonia Chacko (School of Engineering Bowling Green State University, USA)

15:30 – 16:00
Break

8:30 – 9:00
Registration

9:00 – 10:20
Session 3 – Intelligent Robotics
Room: ECSB 1202

9:00
Impromptu: An LLM-Driven Prompt-to-Hardware Circuit Prototyping Platform on a Cartesian Gantry
Vincent Alesi (Rutgers University, USA)
Absa Fall (Rutgers University, Newark, USA)
Matthew Grimalovsky (Rutgers University, Newark, USA)
Adrian Jackson (Rutgers University, Newark, USA)
Deze Liu (Rutgers University, USA)
Daniel Burbano (Rutgers University, USA)
Sasan Haghani (Rutgers University, USA)

9:20
Closing the Gap Between Task and Process: Hand-Guiding vs. No-Code Process-Aligned Teaching in Surface Polishing
Jayanto Halim (Fraunhofer IWU, Germany)
Wen Chen (Fraunhofer Institute for Machine Tools and Forming Technology IWU Germany, Germany)
Akshat Akshat (Fraunhofer Institute for Machine Tools and Forming Technology IWU Germany, Germany)
Mohamad Bdiwi (Fraunhofer Institute for Machine Tools and Forming Technology IWU, Germany)
Steffen Ihlenfeldt (Fraunhofer Institute for Machine Tools and Forming Technology, Germany & Technische Universität Dresden, Chair of Machine Tools Development and Adaptive Controls, Germany)
Ayham Zaitouny (United Arab Emirates University UAEU, United Arab Emirates)

9:40
Design and Depth Tracking of a Robotic Quadrotor-Float for Exploration of Methane Seeps
Rob M. Stuart (Old Dominion University, USA)
Sam Zimmerman (Old Dominion University, USA)
Nathan Hanks (Old Dominion University, USA)
Kirstie Moore (Old Dominion University, USA)
Alexander Bochdansky (Old Dominion University, USA)
Cong Wei (Old Dominion University, USA)
Krishnanand Kaipa (Old Dominion University, USA)

10:00
Predictive, Degradation Aware Sensor Scheduling for Underwater Sonar Navigation
Krishnanand Kaipa (Old Dominion University, USA)
Cong Wei (Old Dominion University, USA)
Daniel O. Akanji (Old Dominion University, USA)

10:20 – 10:55
Break

10:55 – 12:00
Keynote Speaker
Speaker: *Gregory Hager (Johns Hopkins University, USA)*

12:00 – 13:00
Lunch

13:00 – 14:00
Workshop 2: Sensing-Driven Autonomy in Marine Robotics

14:00 – 15:30
Session 4 - Mobile Robotics and Navigation
Room: ECSB 1202

14:00
Adaptive Coverage and Mapping Using LiDAR-only Sensors with Limited Communication
Isaiah Chism (Bradley University, USA)
Md Suruz Miah (Bradley University, USA)

14:20
Infrastructure-Free ADAS Scenario Execution using a Vision-Based Autonomous Mobile Robot
Batuhan Sakal (Porsche Engineering USA, USA)
Ehsan Sharafian Ardakani (Porsche Engineering Services GmbH, Germany)
Hagen Stuebing (Porsche Engineering Services GmbH, Germany)

14:50
How Do Automated Vehicles Influence Following Human Drivers? A Multi-Agent Reinforcement Learning Framework
Qingwen Pu (Old Dominion University, USA)
Kun Xie (Old Dominion University, USA)
Hongyu Guo (Stats New Zealand, New Zealand)
Yuan Zhu (Inner Mongolia University, China)

15:10
Energy-Efficient Trajectory Generation in Polygonal Obstacle Environments Using Dijkstra-Based Planning
Hossein TalebiRostami (Old Dominion University, USA)
Krishnanand Kaipa (Old Dominion University, USA)

15:30 – 16:00
Break

16:00 – 17:20
Session 5 - Perception, Planning, and Control
Room: ECSB 1202

16:00
Learning Goodness Fields for Collision-Aware Robot Motion Planning
Jeffrey E. Richley (Mechanical and Aerospace Engineering Old Dominion University, USA)
Krishnanand Kaipa (Old Dominion University, USA)

16:20
A Hybrid Handcrafted-Deep Feature Fusion Framework for Detecting Conventional Forgeries and Deepfakes
Seema Islam (Dept. of Software Engineering University of Engineering and Technology, Pakistan)
Ali Javed (UET TAXILA, Pakistan)
Muteb Aljasem and Mohammad Abouheaf (Bowling Green State University, USA)

16:40

Efficient Integration of Domain Knowledge and Data-Driven Methods for Securing Autonomous Cyber-Physical Systems

Asim Zoulkarni (University of Maryland, College Park, USA)
Mahshid Noorani (University of Maryland, USA)
John S. Baras (University of Maryland, USA)
Jack Mirenzi (University of Maryland, College Park, USA)
Tharun V. Puthanveettil (University of Maryland, College Park, USA)
Charles D. Grody (University of Maryland, College Park, USA)

17:00

Optimal Control with Physics-Informed Boundary Conditions for a 4DOF Manipulator

Brock M Marcinczyk (Research, USA & Old Dominion University, USA)
Logan E Beaver (Old Dominion University, USA)

18:00 – 20:00
Gala Dinner

Shuttle pickup from ECSB at 5:45 PM and return transportation from the venue at 8:00 PM.