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Keynote Speakers

Prof. Zhong-Ping Jiang
New York University, USA

Biography: Prof. Jiang is known for his contributions to stability and control of interconnected nonlinear systems, and is a key contributor to the nonlinear small-gain theory. His recent research focuses on robust adaptive dynamic programming, learning-based optimal control, nonlinear control, distributed control and optimization, and their applications to computational and systems neuroscience, connected transportation, and cyber-physical-human systems.

Prof. Jiang is a Deputy Editor-in-Chief of the *IEEE/CAA Journal of Automatica Sinica* and has served as Senior Editor for the *IEEE Control Systems Letters (L-CSS), Systems & Control Letters* and *Journal of Decision and Control*, Subject Editor, Associate Editor and/or Guest Editor for several journals including *International Journal of Robust and Nonlinear Control, Mathematics of Control, Signals and Systems*, *IEEE Transactions on Automatic Control*, *European Journal of Control*, and *Science China: Information Sciences*.

Speech Title: Control of Autonomous Vehicles in Mixed Traffic Environment

Abstract: This talk presents a unified framework for the problem of learning-based adaptive optimal control of connected human-driven and autonomous vehicles in mixed-traffic environments including both the freeway and ring road settings. Specially, we first investigate the stabilizability of a string of multiple heterogeneous human-driven vehicles (HDVs) and multiple autonomous vehicles (AVs). Then, a linear quadratic regulator problem is formulated and a solution based on reinforcement learning and adaptive dynamic programming techniques is proposed for learning vehicle controllers from data. To start the learning process, an initial stabilizing control law is obtained using the small-gain theorem for the ring road case. Furthermore, it is shown that the obtained optimal control law can achieve a general string stability under appropriate conditions. SUMO simulation is used to validate the performance of the proposed data-driven vehicle controllers for regulating the mixed-traffic flows. If time permits, extensions to automated lane change will be discussed.

Prof. Ning Xi
University of Hong Kong, China

Biography: Ning Xi received his D.Sc. degree in Systems Science and Mathematics from Washington University in St. Louis, Missouri, USA in December 1993. Currently, he is the head of Department of Industrial and Manufacturing Systems

Engineering, the Director of Advanced Technologies Institute and Chair professor of Robotics and Automation at the University of Hong Kong. He was a University Distinguished Professor, the John D. Ryder Professor of Electrical and Computer Engineering and Director of Robotics and Automation Laboratory at Michigan State University. Dr. Xi was awarded SPIE Nano Engineering Award in 2007. In addition, he is a recipient of US National Science Foundation CAREER Award. Dr. Xi is a fellow of IEEE. He also served as the President of IEEE Nanotechnology Council (2010-2011) and the President of IEEE Robotics and Automation Society (2018). His research interests include robotics, manufacturing automation, micro/nano manufacturing, nano sensors and devices, nano bio system applications, and intelligent control and systems.

Speech Title: Wearable Assistive Robots for Aging Society

Abstract: A rapidly aging population is one of the grand challenges facing the society. The number of people aged 65 or older worldwide is estimated to reach 1.6 billion by 2050. A major difficulty that many older people experience is severe limitation in mobility and manipulability in their daily life, resulting in tremendous social and economic challenges. This talk will discuss a User-Centric Co-Creation (UC³) approach to develop intelligent robotic systems to assist mobility and manipulability and prevent falls. The UC³ methodology lays down a theoretical foundation for multi-disciplinary approach to develop personalized wearable assistive systems. It will pave a new avenue to advance the ergonomics and gerontechnology beyond current horizons.

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

Biography: Radu-Emil Precup is currently with the Politehnica University of Timisoara (UPT), Romania, where he became a Professor in the Department of Automation and Applied Informatics, in 2000. Since 2022 he is also a senior researcher (CS I) and the head of the Data Science and Engineering Laboratory of the Center for Fundamental and Advanced Technical Research, Romanian Academy – Timisoara Branch, Romania. From 2016 to 2022, he was an Adjunct Professor within the School of Engineering, Edith Cowan University, Joondalup, WA, Australia. He has been an Associate Editor of IEEE Transactions on Fuzzy Systems (2018-2022), is an Executive Co-Editor-in-Chief of Information Sciences (Elsevier), the Editor-in-Chief of Romanian Journal of Information Science and Technology, and is an editorial board member of several prestigious journals including IEEE Transactions on Neural Networks and Learning Systems, IEEE Transactions on Cybernetics, Engineering Applications of Artificial Intelligence (Elsevier), Applied Soft Computing (Elsevier), Expert Systems with Applications (Elsevier), Evolving Systems (Springer), Applied Artificial Intelligence (Taylor & Francis), Healthcare Analytics (Elsevier), and Communications in Transportation Research (Elsevier).
Prof. Precup is a corresponding member of the Romanian Academy, a Doctor Honoris Causa of the Óbuda University, Budapest, Hungary, and a Doctor Honoris Causa of the Széchenyi István University, Győr, Hungary. He received the Elsevier Scopus Award for Excellence in Global Contribution (2017), was named a 2022 academic data leader by Chief Data Officer (CDO) Magazine, and was listed as one of the top 10 researchers in artificial intelligence and automation (according to IIoT World as of July 2017).

Speech Tipic: Metaheuristic Algorithms and Their Application to Fuzzy Control, Fuzzy Modeling, Mobile Robot Navigation, and Finger Dynamics for Prosthetic Hand Myoelectric-Based Control

Abstract: An optimization problem finds the best, or optimal, solution among all feasible solutions. An optimization problem consists of two key components: the objective function and the constraints, which are optional. The objective function evaluates and compares solutions in the context of all feasible solutions by calculating the desired quantity to be minimized or maximized. Constraints can be added to limit the possible values for the variables of the objective function and possibly to link these variables.
The optimization algorithms find the solutions to the optimization problems (i.e., the optimal solutions) by trying variations of the initial solution and using the information gained to improve the solution. This solution finding can also be considered as learning, which is a popular topic nowadays. The complexity of classical algorithms is very high, which requires rather large amount of computation. Therefore, alternative algorithms with lower complexity are appreciated. Metaheuristic algorithms for finding optimal solutions have become very popular because they are much better in terms of efficiency and complexity than classical algorithms.
This presentation highlights some of the results obtained by the Process Control Group of the Politehnica University of

Timisoara, Romania. The presentation will focus on representative applications implemented in the laboratories of the group, with real-time validation against experimental results, focusing on fuzzy control, fuzzy modeling, mobile robot navigation, and modeling and control of finger dynamics for prosthetic hand myoelectric-based control. Besides prosthetic hand myoelectric-based control, the results highlighted in the presentation include various laboratory equipment such as pendulum crane systems, multi-tank systems, servo systems, twin rotor aerodynamic systems, magnetic levitation systems, anti-lock braking systems, mobile robots, magnetic levitation systems, active mass damper systems, and shape memory alloy systems. (Read More)
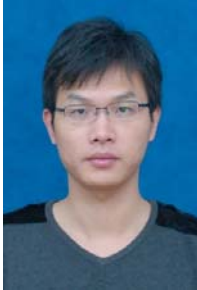
Prof. Ming-Feng Ge

China University of Geosciences, Wuhan, China

Biography: Prof. Ming-Feng Ge received his B.Sc. degree in automation in 2008 and the Ph.D. degree in control theory and control engineering in 2016 both from Huazhong University of Science and Technology, Wuhan, China. He is currently a Professor in the School of Mechanical Engineering and Electronic Information, as well as the head of Department of Mechanical Engineering, China University of Geosciences, Wuhan. He has been named in the world's top 2% of Scientists List of 2023. His research interests lie on robotic systems, hybrid cascade systems, cyber-physical systems, human-in-the-loop systems, and nonlinear control theory.

Prof. Ge is serving as the section editor or associate editor for several international journals, for examples, Science Progress (SAGE Journals), Frontiers in Robotics and AI, Frontiers in Neurorobotics, Electronics Letters (IET), International Journal of Dynamics and Control (Springer), Cyber-Physical Systems (Taylor & Francis Online). He has been the corresponding author of the featured cover paper for VOLUME 31, ISSUE 18 in International Journal of Robust and Nonlinear Control. He has been rewarded as the Outstanding Reviewers of 2019 in Asian Journal of Control. He is a member of the Sakura Science Club and successfully achieved the course of Japan-Asia Youth Exchange program in Science (SAKURA Exchange Program in Science) administered by Japan Science and Technology Agency in 2016. He has been the deputy secretary general of the IEEE Industrial Electronics Society TC16 Technical Committee (China), the Executive Director of TC13 Technical Committee (China) since May, 2022. He has been the Member of Technical Committee on Control Theory (TCCT) Multi-agent Group, Chinese Association of Automation since 2018. He has also served as the General President of 2022 International Conference on Applied Mathematics and Digital Simulation (AMDS 2022), the Vice President of The 8th International Conference on Digital Manufacturing and Automation (ICDMA 2022), as well as many chairs and Special Section Organizers of other international conferences. He has also been invited as the Keynote Speaker in 2017 2nd International Conference on Mechatronics and Electrical Systems (ICMES 2017).