سخنرانان کلیدی

Sensing and Localization for 6G Networks

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زمان سخنرانی: سه‌شنبه ۱۹ اردیبهشت‌ماه ۱۴۰۲ (2023 May 9)ساعت ۱۴:۰۰

محل برگزاری: اطاق شورای دانشکده مهندسی برق دانشگاه صنعتی امیرکبیر

Abstract:

The next generation of wireless systems will employ networking equipment mounted on mobile platforms, unmanned air vehicles (UAV), and low-orbit satellites. As a result, the topology of 6G wireless technology will extend to 3D vertical networking. With its extended service, 6G will also give rise to new challenges which include the introduction of reconfigurable intelligent surfaces (RIS), the mmWave spectrum, the employment of massive MIMO systems, and the agility of networks. One of the key elements of 6G technology is the need for accurate sensing and positioning. The emergence of new research activities in Integrated Sensing and Communication (ISAC) is to find answers to some of these open and important problems. In this talk, we will discuss how sensing and positioning can be a key enabler of 6G, and what challenges the next generation localization technology will face when integrated into the new wireless networks.

Biography

Shahrokh Valaee is a Professor with the Edward S. Rogers Sr. Department of Electrical and Computer Engineering, University of Toronto, and the holder of Nortel Chair of Network Architectures and Services. He is the Founder and the Director of the Wireless Innovation Research Laboratory (WIRLab) at the University of Toronto. Professor Valaee was the TPC Co-Chair and the Local Organization Chair of the IEEE Personal Mobile Indoor Radio Communication (PIMRC) Symposium 2011. He was the TPC Co-Chair of ICT 2015, and PIMRC 2017, and the Track Co-Chair of WCNC 2014, PIMRC 2020, VTC Fall 2020. He is the co-chair of the organizing committee for PIMRC 2023. From December 2010 to December 2012, he was the Associate Editor of the IEEE Signal Processing Letters. From 2010 to 2015, he served as an

Editor of IEEE Transactions on Wireless Communications. Currently, he is an Editor of the Journal of Computer and System Science and serves as a Distinguished Lecturer for IEEE Communication Society. He was the co-recipient of the best paper award in the IEEE Machine Learning for Signal Processing (MLSP) 2020 workshop. Professor Valaee is a Fellow of the Engineering Institute of Canada, and a Fellow of IEEE.

عنوان: فراتر از 5G (Beyond 5G)

دکتر وحید شاه‌منصوری

زمان سخنرانی: چهارشنبه ۲۰ اردیبهشت‌ماه ۱۴۰۲ (10 May 2023) ساعت ۰۸:۳۰

محل برگزاری: اطاق شورای دانشکده مهندسی برق دانشگاه صنعتی امیرکبیر

چکیده

چکیده: نسل‌های جدید شبکه‌های سلولی برپایه نیازمندی‌های کاربردی و تجاری (application and business use cases) طراحی می‌شوند و با کمک فناوری‌های فعال‌کننده (enabling technologies) به واقعیت تبدیل می شوند. نیازمندی های کاربردی و تجاری نسل ششم توسط واحدهای حکمرانی (governance bodies) مانند ITU ، NGMN و GPP3 تبیین می‌شوند. فناوری های نوظهور جهت تحقق نیازمندی های نسل جدید برپایه پژوهش‌های کاربردی در حوزه های مختلف اعم از رادیویی، شبکه و هسته توسط مراکز تحقیاتی و پژوهشی توسعه پیدا می کنند. در این ارائه، ابتدا تحقق اهدافی که برای G5 تصور شده بود مرور می شود و موفقیت ها و شکست های نسل پنجم مرور می شود. سپس مروری بر نیازمندی های فناورانه نسل ششم (6G) خواهیم داشت. فناوری‌های فعال کننده G6 و مسیر های تحقیقاتی و چالش‌های آن در این حوزه بررسی خواهد شد.

Mechatronic Dampers for Automotive and Energy Conversion

Professor Mehrdad Moallem

زمان سخنرانی: چهارشنبه ۲۰ اردیبهشت‌ماه ۱۴۰۲ (10 May 2023) ساعت ۰۸:۳۰

محل برگزاری: اطاق شورای دانشکده مهندسی برق دانشگاه صنعتی امیرکبیر

ABSTRACT

In this talk, I will present a multidisciplinary research program related to developing mechatronic dampers. First, the concept of regenerative damping is presented in which the mechanism can regenerate energy, rather than dissipating it in the form of heat as done in conventional dampers. This idea is similar to regenerative braking in electric vehicles, with the main difference being that mechanical vibration energy, rather than the wheel kinetic energy, is recuperated into battery charge. Next the development of a semi-active electronically tunable shock absorber for mountain bikes is presented using magnetorheological fluids using an innovative low power magnetic circuit design. The above efforts were mainly conducted by graduate students in the School of Mechatronic Systems Engineering and are representative of research projects in the PhD program under the joint supervision of myself and colleagues in our school.

Bio-sketch:

Mehrdad Moallem, PhD, PEng is Professor of Mechatronic Systems Engineering at the Faculty of Applied Sciences, Simon Fraser University (SFU). Before joining SFU, he held research and faculty and research positions in Duke University, Durham, NC, USA, and the Department of Electrical & Computer Engineering, Western University, London, Ontario, Canada.

Dr. Moallem has extensive experience in various fields related to automation and control including mechatronics, robotics, real-time systems, energy systems, and power electronics conversion. He

has published extensively in the above fields with over 250 refereed conference and journal papers, five books, and four patents. During his career, he has taught a wide range of courses including electronics, circuits, linear and nonlinear control, mechatronics design, and robotic control. Dr. Moallem owes much of his academic achievements to more than 50 graduate students and postdoctoral fellows whom he has supervised or co-supervised and many undergraduate students Dr. Moallem has been on the editorial boards of mainstream conferences and journals in control and mechatronics including the American Control Conference, IEEE/ASME Transactions on Mechatronics, IFAC Journal of Mechatronics, International Journal of Intelligent Robotics and Applications (Springer), and MDPI Journal of Automation.

Artificial Intelligence: Negatives and Positives

Hamid R. Arabnia, PhD.

Professor Emeritus, Computer Science

Editor-in-Chief, The Journal of Supercomputing (Springer Nature)

Editor, Transactions of Computational Science & Computational Intelligence (Springer Nature)

The University of Georgia

School of Computing

زمان سخنرانی: چهارشنبه ۲۰ اردیبهشت‌ماه ۱۴۰۲ (10 May 2023) ساعت ۱۴:۰۰

محل برگزاری: اطاق شورای دانشکده مهندسی برق دانشگاه صنعتی امیرکبیر

ABSTRACT

The objective of this lecture is to provide a concise overview of the field of Artificial Intelligence (AI), with a particular focus on its impact on society and governments. AI is an interdisciplinary field that involves the science and engineering of intelligent machines and systems. It plays a crucial role in automation, enabling the solution of complex problems in computer science and industry. This presentation will cover a range of topics, including Language Models, Brain Model, Knowledge Discovery, Noise Removal (Removal of Redundant Information), Automation, Impact on Employment, Impact on Governments, Impact on Democracies, Reasoning strategies, and more. While the discussion will aim to be non-technical, attendees will gain a clear understanding of these concepts and their relevance to AI. Furthermore, the lecture will present a compelling case for the exponential growth of AI applications and automation. The challenges currently facing the field will be discussed, and it will be argued that the solutions to these challenges will be addressed by the young generation.

In summary, this lecture offers a unique opportunity to gain insight into the field of AI and its impact on society and governments. Attendees will gain a comprehensive understanding of the current state of AI and the challenges that lie ahead.

Speaker Biography

Hamid R. Arabnia received a Ph.D. degree in Computer Science from the University of Kent (England) in 1987. He is currently a Professor Emeritus of Computer Science at University of Georgia (Georgia, USA), where he has been since October 1987. He currently (Year 2023) has 8 PhD students working under his supervision. He has graduated 22 PhD students. His research interests include supercomputing, Data Science, Deep Learning / AI, imaging science, and other compute intensive problems. He is Co-Director of AMIIE Lab (Applied AI Research & Education to Solve Real-World Problems: https://amiielab.github.io/index.html) and a member of Academic Advisory Board Pitt HexAI (Pitt Health + Explainable AI: https://pitthexai.github.io/)

Prof. Arabnia is Editor-in-Chief of The Journal of Supercomputing (Springer). He is the book series editor-in-chief of "Transactions of Computational Science and Computational Intelligence" (Springer). He is the editor of annual proceedings of Computational Science and Computational Intelligence (Publisher: IEEE CPS). He is a Senior Adviser to a number of corporations and is a Fellow and Adviser of Center of Excellence in Terrorism, Resilience, Intelligence & Organized Crime Research (CENTRIC, UK). He has served as a member of National Science Foundation (NSF) Site Visitation evaluation committee for 10 years. Prof. Arabnia has about 320 peer-reviewed research publications as well as 250 edited research books in his areas of expertise (some of these books and journal special issues have received the top 25% downloads in their respective fields). He has been a PI/Co-PI on about $12 Million externally funded projects/initiatives. During his tenure as Graduate Coordinator/Director, Prof. Arabnia secured the largest level of funding in the history of the department for supporting the research and education of graduate students (PhD, MS). Prof. Arabnia has delivered a number of keynote and plenary lectures at international conferences; most recently at: IEEE ICPADS, IEEE HPCC, ACM IMCOM, and others.

Web links:

HomePage: http://cobweb.cs.uga.edu/~hra/

Google Scholar: https://scholar.google.com/citations?user=g86VLOUAAAAJ&hl=en

CENTRIC: https://research.shu.ac.uk/centric/

Transactions: https://www.springer.com/series/11769

TJS: https://www.springer.com/journal/11227

Design and Implementation of a 23-29GHz Receiver with mm-Wave N-Input-N-Output Spatial Notch Filtering and Autonomous Notch-Steering

Masoud Babaie, Phd

زمان سخنرانی: پنج‌شنبه ۲۱ اردیبهشت‌ماه ۱۴۰۲ (2023 May 11) ساعت ۰۸:۳۰

محل برگزاری: اطاق شورای دانشکده مهندسی برق دانشگاه صنعتی امیرکبیر

ABSTRACT

Digital beamforming receivers support multi-input-multi-output (MIMO) operation and offer great flexibility and accuracy in multi-beam formation and calibration. However, compared with analog phased-array and hybrid systems, due to the absence of any rejection for spatial in-band blockers, the dynamic range and linearity of the receiver and its analog-to-digital converter (ADC) should be high enough to prevent array saturation. Therefore, the use of self-steering spatial notch filters (SNFs) is necessary to aid the digital beamformers and reduce RX/ADC power consumption while strong blockers exist. To address that, the prior-art sub-6GHz receivers synthesize a baseband spatial notch impedance and translate it to RF by passive mixers. However, this technique cannot be directly applied at mm-wave frequencies as the impedance translational performance of the passive mixers degrades significantly. Hence, the prior art mm-wave beamformer realized a cascadable SNF at an intermediate frequency (IF). However, the front-end mm-wave components like mixers and phase shifters have to tolerate strong blockers, thus degrading RX linearity. Besides, it uses multiple IF buffers and variable gain amplifiers for signal scaling and combining, which could be power-hungry if a similar method is adopted to realize a mm-wave SNF. To improve on those limitations, in this workshop, we propose a scalable SNF structure, which (1) suppresses the strongest in-band blocker at mm-wave frequencies, (2) supports N-input-N-output MIMOs, and (3) requires no active blocks except the phase shifters. A two-step autonomous notch-

steering technique is also developed to adjust the SNF notch direction power-efficiently and accurately.

Short Bio

Masoud Babaie is currently an Associate Professor at the Delft University of Technology, Delft, The Netherlands. His research interests include RF/millimeter-wave integrated circuits for wireless communications and cryogenic electronics for quantum computation. Dr. Babaie currently serves as a technical program committee (TPC) member of the ISSCC and ESSCIRC conferences. He was a co-recipient of the 2019 IEEE ISSCC Demonstration Session Certificate of Recognition, the 2020 IEEE ISSCC Jan Van Vessem Award for Outstanding European Paper, and the 2022 IEEE CICC Best Paper Award. In 2019, he received the Veni Award from the Netherlands organization for scientific research.

Machine Learning Applications in Power System Analyses

Mohammad Shahidehpour, IEEE Fellow
Galvin Center for Electricity Innovation, Illinois Institute of Technology

زمان سخنرانی: پنج‌شنبه ۲۱ اردیبهشت‌ماه ۱۴۰۲ (2023 May 11) ساعت ۱۴:۰۰

محل برگزاری: اطاق شورای دانشکده مهندسی برق دانشگاه صنعتی امیرکبیر

Abstract

Modern power systems are large, distributed, dynamic, uncertain, and complex machines with a wide range of heterogeneous and spatially-distributed electrical components, e.g., distributed energy resources (DERs), electric vehicles (EVs), intelligent switches, and smart meters. With the fast-growing penetration of distributed devices and technologies in electric power systems, advanced communication, computation, and control infrastructures are progressively utilized by stakeholders for substantiating a more efficient, reliable, resilient, sustainable, economic, and secure management of electricity grid. However, a rigorous modeling of complex power system operations is becoming more challenging as distributed, data-oriented, closely-coupled, and highly uncertain components are blended into power systems. With steady advances in communication and computational technologies, e.g., 5G networks and edge-computing, machine learning techniques will evolve as a viable tool to embrace new opportunities and challenges for power system optimization. Machine learning, which is an extension of the artificial intelligence practice in power systems, is portrayed as a data analytic technique that can train computers to complete complicated operation tasks and arrive at credible decisions automatically via a specific learning process. This presentation offers a review of machine learning techniques and their potential applications in the optimal operation and control of distributed power systems.

Biography

Dr. Mohammad Shahidehpour is a University Distinguished Professor, Bodine Chair Professor of Electrical and Computer Engineering, and Director of the Robert W. Galvin Center for Electricity

Innovation at Illinois Institute of Technology (IIT). He has over 40 years of experience with power system operation, planning, and control and has completed several major projects for the electric energy sector. His project on Perfect Power Systems has converted the entire IIT Campus to an islandable microgrid. Dr. Shahidehpour was the recipient of several technical awards including of the IEEE Burke Hayes Award for his research on hydrokinetics, IEEE/PES Outstanding Power Engineering Educator Award, IEEE/PES Ramakumar Family Renewable Energy Excellence Award, IEEE/PES Douglas M. Staszesky Distribution Automation Award, and the Edison Electric Institute's Power Engineering Educator Award. He has co-authored 6 books and over 800 technical papers on electric power system operation and planning, and served as the founding Editor-in-Chief of the IEEE Transactions on Smart Grid. Dr. Shahidehpour is the recipient of the 2009 honorary doctorate from the Polytechnic University of Bucharest. He is a Fellow of IEEE, Fellow of the American Association for the Advancement of Science (AAAS), Fellow of the National Academy of Inventors (NAI), and an elected member of the US National Academy of Engineering (NAE). He is also listed as a highly cited researcher on the Web of Science (ranked in the top 1% by citations demonstrating significant influence among his peers).