AUS | الجــامــعــة الأمـيـركـيــة في الـشــارقـة
American University of Sharjah

ICCSPA'20

Forth International Conference on Communications, Signal Processing and their Applications

March 16–18, 2021
Sharjah, United Arab Emirates

Technical Sponsors: IEEE UAE Section

IEEE

Welcome Message

Welcome to the 2020 International Conference on Communications, Signal Processing and their Applications (ICCSPA'20). The aim of the conference is to provide researchers and practitioners a venue for presenting their latest research findings and to provide a forum for discussions and networking among the participants. The conference themes cover a wide range of topics related to wireless and mobile communications, 5G and beyond wireless networks, cognitive radio systems, cooperative radio, multimedia communications and networking, connected and autonomous vehicles, biometrics, image and video processing, applied machine intelligence, biomedical applications and compressive sensing, among others.

The organizing committee has prepared a rich and interesting program including four keynote lectures by distinguished professors, one 5G discussion panel, one IoT demo, four tutorials, a student poster session, and several technical sessions. Due to the global pandemic, the conference is held virtually with live presentations of the key activities while the paper presentations are provided via recorded videos. The presented papers will appear on IEEE Xplore. In this regard, we would like to acknowledge the IEEE UAE Section and the IEEE for their technical sponsorship.

We would like to thank the authors who submitted their work to the conference. We received papers from different regions and countries, making ICCSPA'20 an international event. After a rigorous review process, 64 papers are included within nine technical sessions. Our thanks also go to the keynote speakers, tutorial presenters and session chairs for their invaluable contribution to the success of ICCSPA'20. Special thanks go to the members of the technical program committee and the large number of reviewers, who worked diligently on producing such a distinguished program. We also extend our appreciation to the members of the organizing committee for their dedication and excellent work on managing all aspects of the conference. In addition, we extend our thanks to the administration of American University of Sharjah for its support.

We wish you a successful event and hope to meet you in future ICCSPA events.

Mohamed El-Tarhuni and Aboelmagd Noureldin
ICCSPA'20 Co-Chairs

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Program Overview

UAE Local Time	EDT (US/Canada)	Day 1: Tuesday, March 16, 2021	
17:30 – 18:00	9:30 – 10:00	Opening Remarks	
18:00 – 18:45	10:00 – 10:45	Keynote Speech 1: From Connected Things to Connected Intelligence for 6G Wireless Systems Professor Khaled B. Letaief	
18:45 – 19:30	10:45 – 11:30	Keynote Speech 2: 6G Hyper-connecting the Connected & Connecting the Unconnected Professor Mohamed-Slim Alouini	
19:30 – 19:45	11:30 – 11:45	Break	
19:45 – 20:30	11:45 – 12:30	Panel: The Opportunities around 5G Wireless Communication – Hype vs Reality Professor Hossam Hassanein Professor Mohamed-Slim Alouini Mr. Saleem Alblooshi	
20:30 – 20:45	12:30 – 12:45	Break	
20:45 – 21:30	12:45 – 13:30	Tutorial #1: On the Convergence of IoT and AI Dr. Khalid Elgazzar	Tutorial #2: Deep Learning with Tensor flow 2.0 Dr. Usman Tariq
Time		Day 2: Wednesday, March 17, 2021	
17:00 – 17:45	9:00 – 9:45	Keynote 3: New frontiers for Vehicular Communications in 6G and Beyond Professor Soumaya Cherkaoui	
17:45 – 18:30	9:45 – 10:30	Keynote 4: Navigation Technologies for Future Autonomous Cars Professor Naser El-Sheimy	
18:30 – 18:45	10:30 – 10:45	Break	
18:45 – 19:30	10:45 – 11:30	Tutorial #3: Building on Convergent IoT: Novel Directions in the Tactile Internet Dr. Sharief Oteafy	Tutorial #4: Future of Blockchains for the Management of Electronic Medical Records Dr. Farhan Riaz
19:30 – 19:45	11:30 – 11:45	Break	
19:45 – 20:30	11:45 – 12:30	IOT Demo: Carleton-Cisco IoT Testbed Professor: Mohamed Ibnkahla	
Time			
17:00 – 18:00	9:00 – 10:00	Student Poster Competition	

Keynote Speakers

Tuesday, March 16, 2021   18:00 – 18:45 UAE Time
FROM CONNECTED THINGS TO CONNECTED INTELLIGENCE FOR 6G WIRELESS SYSTEMS

Professor: Khaled B. Letaief, Fellow IEEE and Fellow HKIE
Member, US National Academy of Engineering
New Bright Professor of Engineering, The Hong Kong University of Science and Technology

Abstract:
We are witnessing an exciting time for future wireless networks with the emergence of 5G. In contrast to 3G and 4G, which were mainly a continuation of their predecessors, 5G will represent a revolutionary leap and will have a huge impact on the transformation of wireless communications industries as well as vertical industries. In this talk, we will describe some of the important technologies and innovations ranging from air technologies and network design to services that are needed to meet the demands of the next-generation wireless networks and guarantee broadband ubiquitous communications of all things, including human-to-machine and machine-to-machine, for a connected living. Of particular interest is the wireless evolution to 6th Generation or 6G mobile systems along with the use of machine learning, a powerful artificial intelligence approach, for supporting intelligent networks and optimizing resource allocation problems in wireless networks.

About the Presenter

Dr. Letaief is an internationally recognized leader in wireless communications and networks with research interest in big data analytics systems, mobile cloud and edge computing, tactile Internet, 5G systems and beyond. He is a Member of the United States National Academy of Engineering, Fellow of IEEE, Fellow of Hong Kong Institution of Engineers, and Member of the Hong Kong Academy of Engineering Sciences. He is also recognized by Thomson Reuters as an *ISI Highly Cited Researcher* with over 38,400 citations and *h*-index of 87 and was listed among the 2020 top 30 of *AI 2000 Internet of Things Most Influential Scholars*.

He is the founding Editor-in-Chief of the prestigious *IEEE Transactions on Wireless Communications*. He is the recipient of many distinguished awards and honors including the 2019 *Distinguished Research Excellence Award* by HKUST School of Engineering (*Highest research award* and only one recipient/3 years is honored for his/her contributions); 2019 *IEEE Communications Society and Information Theory Society Joint Paper Award*; 2018 *IEEE Signal Processing Society Young Author Best Paper Award*, 2016 *IEEE Marconi Prize Paper Award in Wireless Communications*, and 2010 *Purdue University Outstanding Electrical and Computer Engineer Award*.

Dr. Letaief is well recognized for his dedicated service to professional societies and in particular IEEE where he has served in many leadership positions. These include IEEE Communications Society President, the world's leading organization for communications professionals with headquarter in New York City and members in 162 countries.

Since 1993, he has been with HKUST where he has held many administrative positions, including Dean of Engineering, Head of the Electronic and Computer Engineering department, and founding Director of Huawei Innovation Laboratory.

Dr. Letaief received the BS degree with distinction, MS and Ph.D. Degrees in Electrical Engineering from Purdue University at West Lafayette, Indiana, USA.

Tuesday, March 16, 2021   18:45 – 19:30 UAE Time
6G HYPER-CONNECTING THE CONNECTED & CONNECTING THE UNCONNECTED

Professor: Mohamed-Slim Alouini, Fellow IEEE
King Abdullah University of Science and Technology (KAUST)
Kingdom of Saudi Arabia

Abstract:
The role of Internet and Communication Technology (ICT) in bringing about a revolution in almost all aspects of human life needs no introduction. It is indeed a well-known fact that the transmission of the information at a rapid pace has transformed all spheres of human life such as economy, education, and health to name a few. In this context, and as the standardization of the fifth generation (5G) of wireless communication systems (WCSs) has been completed, and 5G networks are in their early stage of deployment, the research visioning and planning of the sixth generation (6G) of WCSs are being initiated. 6G is expected to be the next focus in wireless communication and networking and aim to provide new superior communication services to meet the future hyper-connectivity demands in the 2030s. In addition, keeping in mind that urbanized populations have been the major beneficiary of the advances offered by the previous generations of WCSs and motivated by the recently adopted united nations sustainability development goals intended to be achieved by the year 2030, 6G networks are anticipated to democratize the benefits of ICT. Indeed these advantages are still not experienced by almost 4 billion people in the world who are still "unconnected or under-connected" and who suffer as such from the "digital divide", a term coined in order to emphasize the lack of ICT infrastructure in many parts of the world. Given this background, this talk aims to (i) provide an envisioned picture of 6G, (ii) serve as a research guideline in the beyond 5G era, and (iii) go over the recently proposed solutions to provide high-speed connectivity in under-covered areas to serve and contribute to the development of far-flung regions.

About the Presenter

Dr. Alouini was born in Tunis, Tunisia. He received the Ph.D. degree in Electrical Engineering from the California Institute of Technology (Caltech), USA, in 1998. He served as a faculty member in the University of Minnesota, Minneapolis, MN, USA, then in the Texas A&M University at Qatar, Education City, Doha, Qatar before joining King Abdullah University of Science and Technology (KAUST), Thuwal, Makkah Province, Saudi Arabia as a Professor   of   Electrical   Engineering   in   2009.

Professor Alouini current research interests include design and performance analysis of diversity combining techniques, MIMO techniques, multi-hop/cooperative communications systems, optical wireless communication systems, cognitive radio systems, and multi-resolution, hierarchical and adaptive modulation schemes   as   well   as   high-speed   underwater   wireless   communication   systems.

He has published several papers on the above subjects and he is co-author of the textbook Digital Communication over Fading Channels published by Wiley Interscience. He has also won several awards in his career. For instance, he was honored in 2017 with the Organization of Islamic Cooperation (OIC) Science and Technology (S&T) Achievement Award in Engineering Science at the First OIC Summit on Science and Technology, Astana, Kazakhstan. Prior to this, he received the 2016 Recognition Award of the IEEE Communication Society Wireless Technical Committee and the 2016 Abdul Hameed Shoman Award for Arab Researchers in Engineering Sciences. Other recognitions include his selection as (i) Fellow of the Institute of Electrical and Electronics Engineers (IEEE), the African Academy of Science (AAS), the European Academy of Science and Arts (EASA), and the Academia Europaea (AE), (ii) IEEE Distinguished Lecturer for the IEEE Communication Society and IEEE Vehicular Technology Society, (iii) member for several times in the annual Thomson ISI Web of Knowledge list of Highly Cited Researchers as well as the Shanghai Ranking/Elsevier list of Most Cited Researchers, and (iv) a co-recipient of best paper awards in eleven IEEE conferences (including ICC, GLOBECOM, VTC, PIMRC, ISWCS, and DySPAN).

Wednesday, March 17, 2021   17:00 – 17:45 UAE Time

NEW FRONTIERS FOR VEHICULAR COMMUNICATIONS IN 6G AND BEYOND

Professor: Soumaya Cherkaoui, IEEE Senior Member
Universite de Sherbrooke
Sherbrooke, Canada

Abstract:
Vehicle-to-Vehicle (V2V) and Vehicle-to-Infrastructure (V2I), have opened the door for a plethora of interesting services, both for safety and entertainment, to thrive. Standards for V2V and V2I communications have been proposed in recent years. However, as mobility scenarios evolve towards autonomous vehicles, the need for ultra-reliable and ultra-low latency communications in very dense environments becomes even more severe, and shortcomings of current standards become accentuated. Recent advances in 5G, promise to support vehicular communications and V2X services, and pave the way for a new unified communication fabric for the vehicles of the future. Nevertheless, looking at the current roadmap of 5G, the need to move beyond 5G (B5G) with new technologies and architectures is already apparent. In this talk, we discuss recent advances in 5G to support vehicular communications and V2X services. As well, while a vision of the sixth generation (6G) networks and its underlying enabling technologies is gradually taking momentum, we identify some gaps that motivate the need to move to 6G networks and beyond, to fully realise the vision of the autonomous vehicles of the future.

About the Presenter

Dr. Cherkaoui is a Full Professor at the Department of Electrical and Computer Engineering of Université de Sherbrooke, Canada, which she joined in 1999. Since 2005, she has been the Director of INTERLAB, a research Laboratory which conducts research funded both by government and industry. Before joining U. Sherbrooke, she worked for industry as a project leader on projects targeted at the Aerospace Industry. Pr. Cherkaoui has held invited positions at leading institutions including the University of California at Berkeley, Bell Laboratories, Monash University, and the University of Toronto, as well as an adjunct position at Lulea University, in Sweden. She served on several research-related organizations, including as a member of the Board of Directors of the Canadian Network of Centers of Excellence Auto21, Canada in 2011, a member of the Expert Advisory Panel of Precarn, Canada in 2010 and a member of the Mitacs Research Council in 2017.

Dr. Cherkaoui avails of a long research experience in the wireless networking. Her current research interests include Multi-access edge computing, vehicular communications, machine-to-machine communications, and Internet-of-Things in next generation networks. Her work resulted in technology transfer to companies and to patented technology. Pr. Cherkaoui has published over 200 research papers in reputed journals and conferences. She co-edited 7 books and collective works, has been an associate editor and guest editor of several IEEE, Wiley and Elsevier Journals. Her work was awarded with recognitions and best paper awards including a best paper award at the IEEE ICC conference in 2017. She has chaired prestigious conferences such as IEEE LCN 2019, and has served as a symposium co-chair for flagship conferences including IEEE ICC 2018, IEEE Globecom 2018, Globecom 2015, IEEE ICC 2014, and IEEE PIMRC 2011.

She is a Professional Engineer in Canada, a senior IEEE Member, and has served as the Vice-Chair of the IEEE Communications Society AHSN Technical Committee since 2017.

Wednesday, March 17, 2021   17:45 – 18:30 UAE Time
NAVIGATION TECHNOLOGIES FOR FUTURE AUTONOMOUS CARS

Professor: Naser El-Sheimy, PEng, CRC
President, Profound Positioning Inc (PPI)
Professor and Canada Research Chair, The University of Calgary
Fellow, Canadian Academy of Engineering
Fellow, the US Institute of Navigation (ION)

Abstract:
There are three 'pillars' that define the performance or usefulness of a navigation technologies – cost, accuracy, and continuity. Navigation is a field that has been fascinating humankind for thousands of years and these pillars have been evolving with new technological advancements. The current market in positioning and navigation is clearly dominated by GNSS. Besides being globally available, it meets two important pillars: accuracy and cost by providing the whole range of navigation accuracies at very low cost. It is also highly portable, has low power consumption, and is well suited for integration with other sensors, communication links, and databases.

At this point in the development of navigation technology, the need for alternative positioning systems only arises because GNSS does meet the continuity pillar as it does not work in all environments. Furthermore, there has been a constant market push to develop navigation systems that are accurate, continuous and easy to afford. Needless to say, that cost, and space constraints are currently driving manufacturers of cars, portable devices (e.g. smartphones), and autonomous systems (e.g. self-driving, drones and agriculture machine systems) systems to investigate and develop next generation of low cost and small size navigation systems to meet the fast-growing autonomous vehicles and location services market demands. This presentation will provide a state of the art and future trends of sensors used for navigation of autonomous vehicles: possibilities, limitations and various design approaches. Emphasis will be on sensors and technologies that can navigate autonomous vehicles everywhere and at any time independent of weather and light conditions. Some of the current developed and possible future system's accuracy performance will be demonstrated through different implementations/applications using Propound Positioning Inc technologies.

About the Presenter

Dr. El-Sheimy is Professor and former Head of the Department of Geomatics Engineering, the University of Calgary. He holds a Tier-I Canada Research Chair (CRC) in Geomatics Multi-sensor Systems. His research expertise includes Geomatics multi-sensor systems, GPS/INS integration, and mobile mapping systems. He is the founder and president of Profound Positioning Inc. Dr. El-Sheimy published two books, 6 book chapters and over 450 papers in academic journals, conference and workshop proceedings, in which he has received over 30 national and international paper awards. He supervised and graduated over 60 Masters and PhD students. He is the recipient of many national and international awards including the ASTech "Leadership in Alberta Technology" Award the Association of Professional Engineers, Geologists, and Geophysicists of Alberta (APEGGA) Educational Excellence Award. He also received the Schulich School of Engineering Research Excellence Award, the Schulich School of Engineering Teaching Excellence Award, The UofC Student Union Teaching Excellence Award, and 4 times the departmental teaching award, 2 times departmental research excellence award, and the department of Geomatics Engineering Graduate Educator Award.   Dr. El-Sheimy was the president of Commission I on "Sensors and Platforms" of the International Society for Photogrammetry and Remote Sensing (ISPRS) from 2008 - 2012. He organized and participated in organizing many national and international conferences and chaired many conferences such as the USA Institute of Navigation Global Navigation Satellite Systems (GNSS). Dr. El-Sheimy is currently a member of the Editorial Board of Journal of Survey Review, MDPI Sensors, Journal of Applied Geodesy, and Coordinates.

5G & Beyond Panel

THE OPPORTUNITIES AROUND 5G WIRELESS COMMUNICATION –HYPE VS REALITY

Tuesday, March 16, 2021   19:45 – 20:30 UAE Time

Panel Lead: Professor Hossam Hassanein, IEEE Fellow, Professor and Director, School of Computing, Queen's University, Canada

Panelists:
Professor Mohamed-Slim Alouini, IEEE Fellow, King Abdullah University of Science and Technology (KAUST), Kingdom of Saudi Arabia

Mr. Saleem Alblooshi, Chief Technology Officer, EITC (DU), UAE

Overview:

5G, the next generation mobile network, is anticipated to bring about a technological transformation in modern societies by providing an ultra-reliable high-speed communications infrastructure that will serve billions of devices, machines and vehicles. These devices will contribute massive amounts of data that will need to be pipelined over future 5G networks under the umbrella of future smart cities, connected autonomous cars, and IoT applications. The complexity of 5G networks will hence be unprecedented, due to the very diverse applications, ultra-low latency requirements for critical vehicle communication, growing demand for high positioning accuracy for location-based services, and dense, heterogeneous architectures. This panel addresses a number of challenges around 5G deployment.

- Why is it taking too long? What are the main challenges – Cost? Complexity? Device support? Security   issues?   Other?
- What is the schedule for 5G deployment around the world? What technologies/services will roll   in   first?   Will   users   feel   better   QoS/QoE?   In   what   aspects?
- Is the complexity of 5G rendering traditional radio resource management (RRM) techniques ineffective? Is the future of RRM in artificial intelligence, machine learning and big data analytics?
- How does edge computing benefit 5G and vice versa? Are they inseparable?

About the Lead

Dr. Hassanein is a leading authority in the areas of broadband, wireless and mobile networks architecture, protocols, control and performance evaluation. His record spans more than 500 publications in journals, conferences and book chapters, in addition to numerous keynotes and plenary talks in flagship venues. Dr. Hassanein has received several recognition and best papers awards at top international conferences. He is the founder and director of the Telecommunications Research Lab (TRL) at Queen's University School of Computing, with extensive international academic and industrial collaborations. Dr. Hassanein is a Fellow of the IEEE, and is a former chair of the IEEE Communication Society Technical Committee on Ad Hoc and Sensor Networks (TC AHSN). He is an IEEE Communications Society Distinguished Speaker (Distinguished Lecturer 2008-2010).

Carleton-Cisco IoT Testbed

Wednesday, March 17, 2021   19:45 – 20:30 UAE Time

Professor: Mohamed Ibnkahla, IEEE Senior Member

Cisco Research Chair in Sensor Technology for the Internet of Things

NSERC/Cisco Industrial Research Chair in Sensor Networks for the Internet of Things

Department of Systems and Computer Engineering, Carleton University, Ottawa, Canada

Overview:

The Carleton-Cisco IoT testbed has been built at the Sensor Systems and IoT Lab, Carleton University, under the Cisco Research Chair in Sensor Technology for IoT and the Natural Sciences and Engineering Research Council of Canada (NSERC)/Cisco Industrial Research Chair in Sensor Networks for IoT, with the support of Canadian Foundation for Innovation (CFI) and Ontario Research Fund (ORF). The testbed adopts a layered approach composed of four layers, namely: Sensing layer, edge computing layer, fog computing and core network layer, and cloud layer. The testbed supports the cross-layer nature of the IoT and enables system design and data processing at the different IoT layers starting from the sensing layers up to the cloud. The implemented testbed enables the development of tomorrow's IoT technology by offering accurate multi-user scientific evaluation tools over heterogeneous networks and technologies. The IoT testbed considers the complete cycle of IoT application development and deployment that includes sensing, applications, and middle-layers processing as well as system-level cybersecurity design and management.

About the presenter

Dr. IbnKahla was born in Sousse, a famous coastal city in Tunisia, founded by Phoenician mariners in the 9th century BC (one century before the foundation of Carthage). He obtained the Ph.D. degree and the Habilitation a Diriger des Recherches degree (HDR) from the National Polytechnic Institute of Toulouse (INP), Toulouse, France, in 1996 and 1998, respectively. He obtained an Engineering degree in Electronics (1992) and a Diplome d'Etudes Approfondies degree (equivalent to MSc) in Signal and Image Processing (1992) all from INP. He did part of his undergraduate studies (classes preparatoires) at Lycee Hoche, Versailles, France (1986-1989). He is currently a Full Professor and Cisco Industrial Research Chair at the Department of Systems and Computer Engineering, Carleton University, Ottawa, Canada. He was with the Department of Electrical and Computer Engineering, Queen's University, Kingston, Canada (2000-2015), and the Department of Electronics, INP, Toulouse, France (1996-1999).The Cisco Industrial Research Chair is on "Internet of Everything (IoE) Sensor Networks and Technologies". Dr. Ibnkahla has been leading several projects with industry and government agencies. He is currently involved in a number of projects applying wireless communications in key areas of the e-Society, including: smart power grid, control of renewable energy, water management, public health, environment monitoring, wildlife tracking, food traceability and safety risk monitoring, highway safety, intelligent transportation systems, etc.Dr. Ibnkahla has been the Technical Manager of a major European Advanced Communications Technologies and Services (ACTS) Program (1996-1999). He played major roles in a number of Research Networks and Partnership Programs such as the Natural Sciences and Engineering Research Council of Canada (NSERC) DIVA Network, 2010-2015, Ontario Research Fund (ORF) WISENSE Project, 2009-2015, NSERC COGWSN project, 2011-2014.

Tutorials

Tuesday, March 16, 2021   20:45 – 21:30 UAE Time

Tutorial 1: On the Convergence of Internet of Things and Artificial Intelligence

Professor: Khalid Elgazzar, CRC, IEEE Senior Member
Ontario Tech, Canada

Abstract:
The emergence of Internet of Things (IoT) coupled with artificial intelligence has changed the way we carry out everyday business to become smarter, productive and much safer. There have been many recent revolutions that IoT brought to a wide range of business and industrial sectors including smart cities, healthcare, emergency response, intelligent transportation, industrial automation and agriculture. Drones also have invaded our skies to provide unprecedented opportunities and see things like never before. In this tutorial, I am going to provide a quick update on the status quo of how IoT impacted our lives and what are the opportunities yet to unfold at the current progress pace. Then, I will elaborate on one application enabled by the convergence of IoT and machine learning in the agriculture domain using autonomous drones. Agriculture is ripe with opportunities to incorporate AI analytics, specifically novel and ever-growing deep learning analytics. Visual information for analysis can be collected autonomously using appropriately equipped and programmed mobile robots (drones & ground robots). The tutorial will shed the light on the technical details involving yield estimation using deep learning and Mask R-CNN for object detection and tracking, weed detection, crop disease classification, and fruit ripeness prediction. Pending resource availability, we will do some quick hands-on to better understand the processing pipeline and dataflow across the dataflow stack.

About the Presenter

Dr. Elgazzar is a Canada Research Chair and assistant professor with the Faculty of Engineering and Applied Science at Ontario Tech University, Canada and an holds and adjunct assistant professor at Queen's University where he also received his PhD degree in Computer Science from the School of Computing in 2013. He is the founder and director of the IoT Research Lab at Ontario Tech University. Prior to joining Ontario Tech, he was an assistant professor at University of Louisiana at Lafayette and an NSERC postdoctoral fellow at Carnegie Mellon School of Computer Science. Dr. Elgazzar named the recipient of the outstanding achievement in sponsored research award from UL Lafayette in 2017 and the distinguished research award from Queen's University in 2014. He also received several recognition and best paper award at top international venues. Dr. Elgazzar is a rising world leader in the areas of Internet of Things (IoT), computer systems, real-time data analytics, and mobile computing. Dr. Elgazzar is currently an associate editor for Springer Peer-to-Peer Networking and Applications Journal and Wireless Communications and Mobile Computing. He also chaired a number of IEEE conferences and symposia on mobile computing, communications and IoT. Dr. Elgazzar is Senior IEEE Member and an active volunteer in technical program committees and organizing committees in both IEEE and ACM events.

Tuesday, March 16, 2021   20:45 – 21:30 UAE Time

Tutorial 2: Deep Learning with Tensorflow 2.0

Professor: Usman Tariq
American University of Sharjah, UAE

Abstract:
In this tutorial, the participants will have hands-on experience on the newly released Tensorflow 2.0 library for deep learning applications. Deep learning has had a tangible impact on a number of fields in the recent years. Many libraries help people build deep architectures. Tensorflow is one of the most popular open source libraries out there. In this tutorial, we will go over the basics of Tensorflow 2.0. Then we will learn how to build a neural network, a deep convolutional neural network and long-short term memory networks in Tensorflow 2.0 with practical examples. If we have enough time left, in addition, we may develop a Generative Adversarial Networks as well. We will cover the structures of the different networks in brief; however, this will not be the focus of the tutorial. The focus will primarily be on the practical implementation. The participants are expected to have a working knowledge of Python and NumPy. In addition, the participants are expected to have working knowledge of machine learning and different architectures developed in the tutorial.

About the Presenter

Dr. Tariq is a faculty member in the Electrical Engineering Department at the American University of Sharjah, Sharjah, UAE. He has over 10 years of experience in machine learning, image processing and computer vision. Before AUS, he worked as a Research Scientist in the Computer Vision group at the Xerox Research Center Europe, France. He earned his M.S. and Ph.D. degrees from the Electrical and Computer Engineering Department of University of Illinois at Urbana-Champaign (UIUC), respectively in 2009 and 2013. His research interests include computer vision, image processing, and machine learning.

Wednesday, March 17, 2021   18:45 – 19:30 UAE Time

Tutorial 3: Building on Convergent IoT: Novel Directions in the Tactile Internet

Professor: Sharief Oteafy, IEEE Senior Member
DePaul University, USA

Abstract:
Recent developments in the Internet of Things (IoT) are ever more islandic, pushing the envelope in a myriad of silos. While the research community has produced significant milestones in improving the energy footprint, processing capacity, and overall resilience of IoT systems, today's practitioner is faced with significant challenges in adopting an IoT platform/framework/standard. In this tutorial we will elaborate on the chronological and topological evolution of IoT frameworks, targeting a common understanding of the underlying reference models. We will present and contrast leading standards from industry (e.g., SymphonyLink, Thread, LoRaWAN), academia, and research communities (e.g., IEEE P2413 and ETSI), as well as growing alliances that span multiple stakeholders (e.g., AllSeen and Open Interconnect Consortium). We will present the ensuing challenge of Big Sensed Data (BSD), and the critical challenges facing IoT proliferation. This tutorial will elaborate on the role of Convergent IoT in building the next-generation of the Tactile Internet, and delve into the architectural basis of this nascent technology, and the multiplicity of factors that impact Ultra Reliable Low Latency Communication (URLLC) in a global deployment of the Tactile Internet. We will emphasize recent developments in the IEEE P1918.1 Tactile Internet standard, as the presenter is a key player in the development of the architecture, and secretary of the standard working group.

About the Presenter

Dr. Oteafy is an Assistant Professor at the School of Computing, DePaul University, USA. He received his PhD in 2013 from Queen's University, Canada, focusing on adaptive resource management in Next Generation Sensing Networks. His current research focuses on dynamic architectures for interoperability in the Internet of Things, Information Centric Networks, and managing the proliferation of Big Sensed Data (BSD). He is currently a key player in the design of the Tactile Internet Architecture, under the development of the IEEE P1918.1 Standard Working Group, where he is now the secretary of the WG. He is actively engaged in the IEEE Communications Society (ComSoc). Dr. Oteafy co-authored a book on "Dynamic Wireless Sensor Networks", published by Wiley, presented 50+ publications and delivered multiple IEEE tutorials on IoT and BSD. He co-chaired a number of IEEE symposia and workshops in conjunction with IEEE ICC and IEEE LCN, and served on the technical program committee of numerous IEEE and ACM symposia; recently co-chairing the AHSN track in IEEE Globecom 2018. He is currently an Associate Editor with IEEE Access, and on the editorial board of Wiley's Internet Technology Letters. Dr. Oteafy is a Senior Member of the IEEE, and a professional member of the ACM. He also holds an Adjunct Assistant Professor position at Queen's University.

Wednesday, March 17, 2021   18:45 – 19:30 UAE Time

Tutorial 4: The Future of Blockchains for the Management of Electronic Medical Records

Professor: Farhan Riaz
NUST, Pakistan

Abstract:
Blockchains are a growing list of electronic records that are linked using cryptography and are saved in a distributed way. The key features of blockchains include decentralization, data transparency and privacy. These key features make it possible to use blockchains in several domains, the management of electronic medical records (EMR) of patients being one of the most vital domains exhibiting a lot of potential for future work. Given this, in this tutorial we aim to cover the usage of the principles of blockchain technology in the management of EMR. In this context, a framework will be discussed that maintains patient's medical records in a blockchain and make it accessible to the concerned parties i.e., patient and doctor. Meanwhile the problem of scalability will be highlighted since with the passage of time, the data is supposed to grow exponentially and scalability will eventually become an issue. Moreover, the security aspect of the framework will also be highlighted given the sensitivity of the information that is carried by the EMRs.

About the Presenter

Dr. Riaz received his B.E. degree with distinction from the National University of Sciences and Technology (NUST), Islamabad, Pakistan, M.S. degree from the Technical University of Munich, Germany, and Ph.D. degree again with distinction from the University of Porto, Portugal. Since 2012, he has been serving NUST as a Faculty Member. He has about 11 years of experience in the area of computer vision, pattern recognition and signal processing, specifically applied to the Biomedical signal/imaging scenarios. He has 19 impact factor journal publications and about 40+ conference publications. His h-index is 11 and cumulative impact factor is 40+. In addition to his experience of working as a faculty member, he has also worked as a computer vision consultant with the Instituto de Telecomunicacoes, Porto, Portugal on various projects. During his Masters studies, he also worked part time with two multinational companies, Intel and NTT DoCoMo Euro labs where he worked in the RFID development team for supply chain management and design of wireless protocols respectively. Dr. Farhan has earned research funding worth 9.1 Million PKR, a project worth 47 Million PKR is almost positively negotiated. He has obtained various awards; most notably his team won Silver Medal in 2013 Asia Pacific ICT Awards and one of his research papers published in IEEE Transaction on Neural Systems and Rehabilitation Engineering won 3rd prize in the 2019 IEEE Engineering in Medicine and Biology Prize Paper Award.

Technical Sessions

S1 - NOMA and Channel Modeling

S2 - Localization and Tracking

S3 - Communications and Networking

S4 - Machine Learning and Classification

S5 - MIMO and Beamforming

S6 - Biomedical Applications

S7 - Networking and Applications

S8 - Computing and Networking

S9 - Light Enabled Networks and Applications

S1 - NOMA and Channel Modeling

Small-Scale Indoor Channel Measurements at 24 GHz on a University Campus
Mohammad Abo rahama, Amer Zakaria, Mahmoud H. Ismail, Marawan El-Bardicy and Mohamed El-Tarhuni (American University of Sharjah, United Arab Emirates)

Energy-Efficiency Maximization in Downlink Clustered NOMA Networks with Energy-Harvesting Relays
Mohammed W. Baidas (Kuwait University, Kuwait)

Network Sum-Rate Maximization via Joint Relay Selection and Power Allocation in Energy-Harvesting NOMA Multicast Cognitive Radio Networks
Mohammed W. Baidas (Kuwait University, Kuwait); Mohammadreza Amini (Islamic Azad University, Iran)

On the Performance of Downlink NOMA Systems over Hyper-Rayleigh Fading Channels
Mohammad Ahmad Al-Jarrah, Jr. (University of Manchester, United Kingdom (Great Britain)); Emad Alsusa (Manchester University, United Kingdom (Great Britain)); Arafat Al-Dweik (Khalifa University, United Arab Emirates)

Cascaded κ-μ Fading Channels with Colluding Eavesdroppers: Physical-Layer Security Analysis
Walaa Hamouda and Deemah Tashman (Concordia University, Canada)

Performance Analysis of URLL Random-Access NOMA-Enabled IoT Networks with Short Packet and Diversity Transmissions
Mohammadreza Amini (Islamic Azad University, Iran); Mohammed W. Baidas (Kuwait University, Kuwait)

S2 - Localization and Tracking

Application of System Identification Techniques for Integrated Navigation
Umar Iqbal (Mississippi State University & The Bagley College of Engineering, USA); Jacques Georgy (TDK-Invensense, Canada); Aboelmagd Noureldin (Royal Military College of Canada & School of Computing, Queen's University, Canada); Michael Korenberg (Queen's University, Canada)

Fog Node Optimum Placement and Configuration Technique for VANETs
Rehab Shahin (Ain Shams University, Egypt); Ali A. El-Moursy (University of Sharjah, United Arab Emirates); Sherif Saif (Electronics Research Institute, Egypt); Hazem Abbas (Ain Shams University, Egypt); Salwa Nassar (Computer & Control Department, Electronic Research Institute, Cairo, Egypt)

An Efficient Multi-Object Tracking and Counting Framework Using Video Streaming in Urban Vehicular Environments

Ahmed Dirir, Mohammed Adib, Anas Mahmoud, Moatasem Al-Gunaid and Hesham El-Sayed (United Arab Emirates University, United Arab Emirates)

Mass Flow Meter and Vehicle Information DR Land Vehicles Navigation System in Indoor Environment

Mohamed Moussa (University of Calgary, Canada); Adel Elsayed Moussa (University of Calgary, Canada & Port-Said University, Egypt); Abanob M.A Salib and Naser El-Sheimy (University of Calgary, Canada)

Dual Band Slotted Ground Microstrip Antenna for Location Tracking Systems

Sam U Kollannore (Cochin University of Science and Technology, India); Abdulla P (Cochin University of Science & Technology, India); Anu A r (CUSAT, India); Ami Iqubal (Cochin University of Science and Engineering, India)

Evaluation of 5G Cell Densification for Autonomous Vehicles Positioning in Urban Settings

Sharief Saleh, Amr El-Wakeel and Sameh Sorour (Queen's University, Canada); Aboelmagd Noureldin (Royal Military College of Canada & School of Computing, Queen's University, Canada)

Visual Heading Estimation for UAVs in Indoor Environments

Abanob M.A Salib (University of Calgary, Canada); Adel Elsayed Moussa (University of Calgary, Canada & Port-Said University, Egypt); Mohamed Moussa and Naser El-Sheimy (University of Calgary, Canada)

DOA Estimation in Wireless Seismic Surveys Using Deep Learning

Ahmed Almehdhar, Adnan Hamida and Kabiru Nasiru Aliyu (King Fahd University of Petroleum and Minerals, Saudi Arabia); Saleh A. Alawsh (KFUPM, Saudi Arabia); Ali H Muqaibel, Suhail Al-Dharrab and Wessam Mesbah (King Fahd University of Petroleum and Minerals, Saudi Arabia); Gordon Stüber (Georgia Institute of Technology, USA)

S3 - Communications and Networking

An Empirical Analysis of IEEE 802.11ax

Siraj Muhammad and Jiamiao Zhao (University of Oklahoma, USA); Hazem Refai (Oklahoma University, USA)

Network Coding Schemes for Time Variant/Invariant Channels with Smart Acknowledgment

Samah A. M. Ghanem (Independent, Portugal)

Model Checking Based Unmanned Aerial Vehicle (UAV) Security Analysis

Eman Shaikh (American University of Sharjah, United Arab Emirates); Nazeeruddin Mohammad and Shahabuddin Muhammad (Prince Mohammad Bin Fahd University, Saudi Arabia)

Digital Baseband Modulation Termination in RFID Tags for a Streamlined Collision Resolution

Abdallah Alma'aitah and Mohammad Massad (Jordan University of Science and Technology, Jordan)

Data Collection in Advanced Metering Infrastructure Using UAVs

Mostafa Shaaban and Mahmoud H. Ismail (American University of Sharjah, United Arab Emirates); Hebat-Allah Mourad and Ahmed Khattab (Cairo University, Egypt)

S4 - Machine Learning and Classification

Real-time Littering Detection for Smart City using Deep Learning Algorithm
Khorchani Basma (InnovCom, Tunisia); Kaouthar Sethom (Ecole Nationale des Ingenieurs de Carthage, Tunisia)

Extended Rhythm-Based Investigation of Saudi Dialects Using the Saudi Accented Arabic Voice Bank Corpus
Soha B. Sandouka (king Saud University, Saudi Arabia); Yousef A Alotaibi (King Saud University, Saudi Arabia)

Detection of Human Body Movement Patterns Using IMU and Barometer
Mohammed Alarfaj (King Faisal University, Saudi Arabia)

A Novel Face Inpainting Approach based on guided Deep Learning
Nermin M. Salem (Future University in Egypt, Egypt)

Arabic Speech Synthesis using Deep Neural Networks
Aya Hamdy Ali, Mohamed Magdy, Maher Alfawzy and Mikhail Ghaly (Global Technical Services (GTS), Egypt); Hazem Abbas (Ain Shams University, Egypt)

Facial Expression Recognition Using a Simplified Convolutional Neural Network Model
Amany A. Kandeel and Mina Rahmanian (Queen's University, Canada); Farhana H. Zulkernine (Queen's University & CA Canada, Canada); Hazem Abbas (Ain Shams University, Egypt); Hossam S. Hassanein (Queen's University, Canada)

Using Machine Learning for In-Out decision accuracy for venue owner definable services
Wiqar Khan (University of Vaasa & NOKIA, Finland); Matti Keskinen (NOKIA, Finland); Asif Raza (Arcada University of Applied Sciences, Finland); Heidi Kuusniemi (Finnish Geospatial Research Institute & National Land Survey, Finland); Mohammed Salem Elmusrati (University of Vaasa, Finland)

Balancing Approaches towards ML for IDS: A Survey for the CSE-CIC IDS Dataset
Subiksha Srinivasa Gopalan (Rochester Institute of Technology - Dubai, United Arab Emirates); Dharshini Ravikumar (Rochester Institute of Technology, United Arab Emirates); Dino Linekar (Rochester Institute of Technology, Dubai, United Arab Emirates); Ali Raza and Maheen Hasib (Rochester Institute of Technology, Dubai, UAE, United Arab Emirates)

S5 - MIMO and Beamforming

Traffic Adaptive Transmission Schemes for the Internet of Things
Chowdhury Ferdowsy, Zied Bouida and Mohamed Ibnkahla (Carleton University, Canada)

Improved Parallel ZF-VBLAST Detector for MIMO System
Oruba Alfawaz and Maha Alaa Eddin (UoS, United Arab Emirates); Khawla Alnajjar and Ali A. El-Moursy (University of Sharjah, United Arab Emirates)

OMP-based hybrid precoding and SVD-based hybrid combiner design with partial CSI for massive MU-MIMO mmWave system
Alvaro Ortega (Sidia Institute of Science and Technology, Brazil)

Comparative Study of Adaptive Beamforming Algorithms for Smart antenna Applications
Mohammad Omar Abualhayja'a (United Arab Emirates University, United Arab Emirates); Mousa Hussein (UAE University, United Arab Emirates)

Communications design in multi-robotic systems

Manu Nair (Royal Military College of Canada, Canada); Sidney Givigi (Queen's University & Royal Military College of Canada, Canada)

S6 - Biomedical Applications

Image Classification in Microwave Tomography using a Parametric Intensity Model
Mohanad Alkhodari, Amer Zakaria and Nasser Qaddoumi (American University of Sharjah, United Arab Emirates)

A Context-Aware IoT-Based Smart Wearable Health Monitoring System
Ahmed K Kassem (Arab Academy for Science, Technology and Maritime Transport, Egypt); Mohamed Tamazin (Arab Acadmey for Science, Technology and Maritime Transport (AASTMT), Egypt & Royal Military College of Canada (RMCC), Canada); Moustafa Hussein Aly (Arab Academy for Science, Technology & Maritime Transport & Vice Dean for Education Affairs, Egypt)

Improving Absorption Properties of Nanoparticles Using Self-Similar Array
Rozaina Abougharbia (Arab Academy for Science, Technology and Maritime Transport, Egypt); Abd Elmonem Nasser (Arab Academy for Science and Technology & Maritime Transport, Egypt); Iman Gamal Eldin Morsi (Arab Academy for Science and Technology, Egypt); Moustafa Hussein Aly (Arab Academy for Science, Technology & Maritime Transport & Vice Dean for Education Affairs, Egypt)

Body Sensors Network Management Protocol
Ahmad Yousef Alhusenat (JORDAN-IRBID & Jordan University of Science and Technology, Jordan); Baha' A Alsaify (Jordan University of Science and Technology, Jordan)

Sequential Encryption for Multiple Implantable Medical Devices
Taha Belkhouja (Washington State University, USA); Sameh Sorour (Queen's University, Canada); Mohamed S Hefeida (West Virginia University, USA)

IoT Security in Healthcare using AI
Subiksha Srinivasa Gopalan (Rochester Institute of Technology - Dubai, United Arab Emirates); Ali Raza (Rochester Institute of Technology, Dubai, UAE, United Arab Emirates); Wesam Almobaideen (Rochester Insitute of Technology, United Arab Emirates)

A Fuzzy-based Image Segmentation on Diabetic Retinopathy Model
Sherin Youssef (Arab Academy For Science and Technology, Egypt); Laurine Ashame and Salema Fayed (Arab Academy for Science, Technology and Maritime Transport, Egypt)

A Novel Compact Wearable Microstrip Patch Antenna for Medical Applications
Sadiq A Alhuwaidi (Prince Mohammad Bin Fahd University, Saudi Arabia); Tanghid Rashid (University of Colorado Colorado Springs, USA)

S7 - Networking and Applications

A Multi-Layer Capsule-based Forensics Model for Fake Detection of Digital Visual Media
Samar S. Khalil (Arab Academy for Science, Technology and Maritime Transport, Egypt); Sherin Youssef (Arab Academy For Science and Technology, Egypt); Sherine N Saleh (Arab Academy for Science, Technology and Maritime Transport & College of Engineering and Technology, Egypt)

Recent Applications of Computing and Mobility Technologies to Modern Manufacturing
Eman Shaikh (American University of Sharjah, United Arab Emirates); Abul Bashar and Nazeeruddin Mohammad (Prince Mohammad Bin Fahd University, Saudi Arabia)

Tunable Q-Enhanced Linear LNA for Wireless Communication
Ziad Elkhatib (Canadian University Dubai, United Arab Emirates); Sherif Moussa (Canadian University of Dubai, United Arab Emirates)

A review of human-to-machine and machine-to-machine approaches for internet of things
Mansoor Syed Raza and Tang Zongsheng (Charles Strut University, Australia); Muhana Magboul Ali Muslam (Al-Imam Muhammad Ibn Saud Islamic University, Saudi Arabia)

Multi-angle lipreading using angle classification and angle-specific feature integration
Shinnosuke Isobe (University of Gifu, Japan); Satoshi Tamura and Satoru Hayamizu (Gifu University, Japan); Yuuto Gotoh and Masaki Nose (Ricoh Company, Japan)

A Review on the Integration of Blockchain and IoT
Alia Al sadawi, Mohamed S. Hassan and Malick Ndiaye (American University of Sharjah, United Arab Emirates)

S8 - Computing and Networking

Colored Ant for Flow Management in Fog Computing
Kaouthar Sethom (Ecole Nationale des Ingenieurs de Carthage, Tunisia)

A Succinct Review Of Intelligent Computational Techniques In Green Cloud Computing
Mansoor Syed Raza and Jia Wei (Charles Strut University, Australia); Muhana Magboul Ali Muslam (Al-Imam Muhammad Ibn Saud Islamic University, Saudi Arabia)

On the Performance of Fog-Cloud Computing for Real-time Surveillance Applications
Saleh Abdalla, Mohamed S. Hassan, Taha Landolsi and Raafat Aburukba (American University of Sharjah, United Arab Emirates)

The parallel machine job splitting and allocation
Samah A. M. Ghanem (Independent, Portugal)

S9 - Light Enabled Networks and Applications

Polarimetric SAR image denoising using the improved IMMSE filter
Mohamed Yahia (American University of Sharjah); Tarig Ali and Maruf Mortula (American University of Sharjah, United Arab Emirates)

Spatiotemporal Prediction Using Hierarchical Bayesian Modeling
Taghreed Alghamdi and Khalid Elgazzar (Ontario Tech University, Canada); Taysseer Sharaf (University of Michigan, Dearborn, USA)

Random Fourier Features based Post-Distortion for Massive-MIMO Visible Light Communication
Pavan Kumar Anand (Indian Institute of Information Technology, Sri City, India); Sandesh Jain (Indian Institute of Technology Indore, India); Rangeet Mitra (ETS Montreal, Canada); Vimal Bhatia (Indian Institute of Technology Indore, India)

Performance Analysis of OTFS Over Multipath Channels for Visible Light Communication
Anupma Sharma and Sandesh Jain (Indian Institute of Technology Indore, India); Rangeet Mitra (ETS Montreal, Canada); Vimal Bhatia (Indian Institute of Technology Indore, India)

List of Accepted Submissions to the Student Poster Competition

At Home physiotherapy Guide
Shahd Youssef Iraki, Engy Hazem, Shahd Mohammed, Shams Otair
Ajman University, United Arab Emirates

Two Diagnostic Approaches for ADHD: Detection of Irregular Blinking Patterns and Poor Motor Inhibition
Noor Hussein Ali, Amna Abdulmoneim Ali, Eman Abushaban, Alaa Ibrahim
Ajman University Ajman, United Arab Emirates

Cardiac Emergency System for Car Drivers
Sara Rakan, Maryam Reda, Samaa Al-Lawindy
Ajman University Ajman, United Arab Emirates

Innovative Trust Management Framework for Vehicular Networks Using Machine Learning Concepts
Henry Ignatious
United Arab Emirates University, United Arab Emirates

Exoskeleton Arm
Yara Badr, Kathrina Baguyo, Yara Tulba
Ajman University Ajman, UAE

Inter-Stakeholder Relationship for Autonomous Driving
Sumbal Malik, Manzoor Ahmed Khan,
United Arab Emirates University, United Arab Emirates

Smart wheelchair moving by head motion and voice recognition
Sarah Al-Najjar, Noor Aldadah, Raghad Ayesh, Yasmine Banat
Ajman University, Ajman, United Arab Emirates

The Connected Car Plates
Hala Bin Dehaish, Aljawharah Alzahrani, Mohamad Dawood Owais
Alfaisal University, Saudi Arabia