IEEE Communications Software Technical Committee

COMMUNICATIONS SOFTWARE

FALL 2020

Communications Software Technical Committee
CommSoft TC

Chair: Adlen Ksentini
Vice-Chair: Abdellatif Kobbane
Secretary: Abd-Elhamid M. Taha

Co-EiCs:
Moayad Aloqaily
Aiman Erbad

https://commsoft.committees.comsoc.org/
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About

The Communications Software (CommSoft) technical committee interest stems from all emerging fields of communications software and its various aspects and applications. The mission of this committee is to advance the state of the art in communications software and its various aspects and applications. It serves as the major forum for discussion among communications software professionals in both academia and industries.

The committee convenes twice a year in tandem with IEEE Communication Society Conferences, namely ICC and Globecom. It supports several Special Interest Groups (SIGs) dedicated to focused topics within the committees.

Moreover, the committee releases a biannual newsletter (i.e. eLetter) on its activity and updates.

Finally, if your interest lieu in the communications software TC interest, please don’t hesitate to join the committee!

The committee past chairs are:

2017-2018 | Hacene Fouchal, University of Reims Champagne-Ardenne
2015-2016 | Lynda Mokdad, University of Paris-Est
2014 | Abdallah Shami, Western University
2012-2013 | Joel Rodrigues, University of Beira Interio, Portugal
2010-2011 | Abdelhamid Mellouk, University of Paris 12
2008-2009 | Pascal Lorenz, University of Haute Alsace
2006-2007 | Algirdas Pakstas, London Metropolitan University
Links

• TC Website

  https://commsoft.committees.comsoc.org/

• TC eLetters

  https://commsoft.committees.comsoc.org/eletter/

• TC SIGs

  https://commsoft.committees.comsoc.org/sigs/

• TC Mailing List

  https://commsoft.committees.comsoc.org/mlist/
Awards/Distinctions

Highly Cited Researchers

A. Top 2% Scientist

This section reports Stanford University’s list of the world’s top 2% scientists. A publicly available database of 100,000 top-scientists that provides standardized information on citations, h-index, and many other factors. We are glad to report the following (CommSoft members) scholars:

- **Hussein Mouftah**, University of Ottawa, Canada.
- **Mohsen Guizani**, Qatar University, Qatar.
- **Melike Erol Kantarci**, University of Ottawa, Canada.
- **Mohamed Amine Ferrag**, Guelma University, Algeria.
- **Marco Di Renzo**, CNRS & Paris-Saclay University, France.
- **Burak Kantarci**, University of Ottawa, Canada.
- **Moayad Aloqaily**, Al Ain University, UAE.
- **Adlen Ksentini**, EURECOM, France.
- **Hossam S. Hassanein**, Queens University

The official database is published here: [https://data.mendeley.com/datasets/btchxktzyw/1](https://data.mendeley.com/datasets/btchxktzyw/1)

Individuals can search their names in one of the following Excel Sheets: Table-S6-career-2019.xlsx and Table-S7-singleyr-2019.xlsx

B. Web of Science

M. H. Rehmani from Cork Institute of Technology (CIT) has been selected for inclusion on the annual [Highly Cited Researchers™](https://clarivate.com/web-of-science/highly-cited-researchers) 2020 list from Clarivate.
Best Paper Awards

1. The paper “Optimal virtual network function placement in multi-cloud service function chaining architecture” by Aiman Erbad (CommSoft Member) has received the best paper award from Elsevier Computer Communications journal.

Popular Articles

1. The paper “On the Feasibility of Deep Learning in Sensor Network Intrusion Detection” by CommSoft members “Safa Otoum, Burak Kantarci, Hussein T. Mouftah” has been marked as one of the most popular articles in IEEE Networking Letters.

2. The paper “Internet Of Things: A Survey On Enabling Technologies, Protocols, And Applications” by CommSoft members “Ala Al-Fuqaha and Mohsen Guizani” has been marked as one of the most popular articles in IEEE Communications Surveys & Tutorials.
   https://ieeexplore.ieee.org/document/7123563
3. The paper “Applications of Blockchains in the Internet of Things: A Comprehensive Survey” by CommSoft member “M. H. Rehmani” has been marked as one of the most popular articles in IEEE Communications Surveys & Tutorials.


4. The paper “DEAL: Differentially Private Auction for Blockchain-Based Microgrids Energy Trading” by CommSoft members “Muneeb Ul Hassan and M. H. Rehmani” has been marked as one of the most popular articles in IEEE Transactions on Services Computing.


5. The paper “Differential Privacy Techniques for Cyber-Physical Systems: A Survey” by CommSoft members “Muneeb Ul Hassan and M. H. Rehmani” has been marked as one of the most popular articles in IEEE Communications Surveys & Tutorials.

https://ieeexplore.ieee.org/document/8854247

Editorial Appointments

- M. H. Rehmani has been appointed as AE in IEEE Transactions on Green Communications and Networking (TGCN) in the area of Green Internet and Service Provisioning.

PATENTS

- S. Kumar M. and J. Ben Othman have filed their patent on “System for Detecting Zero-Day and Spear Phishing Attack, and Method of Working thereon”, Indian Patent & Published, Appl. No.: 201941053278 A. - Foreign & Industry Collaborative Research.
Special Interest Groups Activities

The CommSoft TC currently has the following active SIGs. TC’s SIG Coordinator is M. Ayaida.

- **Blockchains and Applications**
  - Current Coordinator: M. Aloqaily

- **ML and AI for Networking**
  - Current Coordinator: M. Erol-Kantarci

- **NFV and SDN Technologies**
  - Current Coordinator: S. Misra
  - Prior Coordinator: A. Ksentini

- **Security in Software Communication**
  - Current Coordinator: E. Renault
  - Prior Coordinators: J. Ben-Othman and Y. Saavedra

- **Big Data Communication Software**
  - Current Coordinator: H. Moungla
  - Prior Coordinator: P. Chatzimisios

- **Communication Software for Vehicular Ad Hoc Networks**
  - Current Coordinator: H. Fouchal

- **Performance Evaluation in Communications Software**
  - Current Coordinator: A. Kobbane

In this edition of the *eLetter*, we will include the activities conducted by SIGs 1-4.

**Blockchains and Applications**

M. Aloqaily has established this SIG recently. The SIG aims to bring the CommSoft TC members who research falls within the Blockchains and its application. It also plans several events and activities. He is organizing the following activities:


  The track is for CommSoft members. They need to indicate in the cover letter that this submission is for this track and they are CommSoft members!

- **Conference:**

- **Special Issue:**
  - **Title**: Federated Learning and Blockchain Supported Smart Networking in Beyond 5G (B5G) Wireless Communication,
  - **Journal**: Computer Networks,
  - **Deadlines**: April, 15th 2021.

- **Talk on BC Series**
  - Ad Hoc Series on *Blockchain for Sustainable Energy Management*.
  - IEEE ICCSE 2021, Lancaster, UK.
ML and AI for Networking

M. Erol-Kantarci has conducted several activities since she resumed the coordination of her SIG.

➢ She is organizing the following two Special Issues:

   - **Title:** Communications and Computing for Green Industrial IoT and Smart Grids,  
     **Journal:** IEEE Transactions on Green Communications and Networking  
     **Deadline:** March 1st, 2021.  
     **Link:** https://www.comsoc.org/publications/journals/ieee-tgcn/cfp/communications-and-computing-green-industrial-iot-and-smart

   - **Title:** AI and 6G Convergence: an Energy-efficiency Perspective,  
     **Journal:** IEEE Network Magazine  
     **Deadline:** April, 15th 2021.  
     **Link:** https://www.comsoc.org/publications/magazines/ieee-network/cfp/ai-and-6g-convergence-energy-efficiency-perspective

➢ She has also delivered the following keynotes and plenary talks.

   - **Title:** AI-Enabled Future Wireless Networks,  
     **Event:** 16th IFIP International Conference on Network and Service Management (CSNM),  
     **When:** November 2020.

   - **Title:** AI-enabled Transactive Energy Systems and the Role of Communications,  
     **Event:** IEEE International Conference on Advanced Communication Technologies and Networking (CommNet'20),  
     **When:** September 2020.

   - **Title:** AI-enabled Energy Trading for Microgrids and Transactive Energy Systems,  
     **Event:** IEEE Smart Energy Grid Engineering,  
     **When:** August 2020.
**Title:** AI-Enabled Wireless Networks: A Bridge from 5G to 6G,  
**Event:** Global Information Infrastructure Networking Symposium (GIIS),  
**When:** October 2020.

**NFV and SDN Technologies**

S. Misra has carried the responsibilities of this SIG from prior coordinator Adlen Ksentini. Since then, he has conducted several activities and actively engaged in various activities about the current state-of-the-art and research on SDN/NFV as well as identifying new challenges and solutions:

- Short courses/Invited talks/Tutorials:
  - **Panel Speaker:** ICT for Smart Cities, IEEE ANTS, 2020.

- Industrial Activities:
  - He is currently engaged with *Hitachi-ABB Power Grids* as a part of his ongoing project on SDN over Industrial IoT where several SDN based solutions such as Intent-Based SDN and SDN based Blockchain are being investigated for application over actual smart grids.

- Development of new Software/Libraries:
  - SIG members have developed a new software platform that enables service-centric segment routing applications for encrypted data built on the top of the SDN ONOS controller. The software repo can be found on GitHub at [https://github.com/vanvantong/rl-sr](https://github.com/vanvantong/rl-sr) and the corresponding published paper can be found at [https://ieeexplore.ieee.org/document/9269070](https://ieeexplore.ieee.org/document/9269070).

**Security in Software Communication**

E. Renault has carried the responsibilities of this SIG from prior coordinator J. Ben-Othman and Yessica Saavedra. Eric has been involved in the following important project:

- *France Campus Cyber*, which aims at grouping different actors of cybersecurity from academia and industry into a single place to promote the emergence of new solutions and new partnerships. Opening scheduled 2021 Q3.
Ongoing Research Projects

➢ **A. Erbad, M. Guizani, and A. Mohamed** are PIs in a project funded by the **Qatar National Research Fund (QNRF)**.

**Title:** *Ultra-Reliable Low Latency Smart Health System Design over 5G Networks for Patients with Neurological Disorders*, NPRP12S-0305-190231.

The project motivates the use of the edge computing paradigm, which promotes smart ways to process medical data close to where they are collected (i.e., as close as possible to the edge of the network), to optimize the amount and quality of data communicated over 5G, hence, minimizing the delay, energy consumption, and cost associated with data delivery. In this project, we present challenges and develop solutions for designing effective sHealth systems for neurological applications using a holistic framework that captures end-user sensing, mobile device processing, radio access network connectivity, mobile edge computing, remote cloud computing and storage, combined with advanced signal analysis and machine learning intelligence.

➢ **M. Guizani and K. Abualsaud** are the PIs in a project funded by the **Qatar National Research Fund (QNRF)**.

**Title:** *Optimized Security for eHealth Internet of Things Systems*, NPRP10-1205-160012.

The goal of this project is to holistically investigate the security of eHealth/mHealth systems, focusing on the protection of patient information while being transmitted over wireless channels, from the wearable sensors to the local controller at home, from the controller to the destination servers of the healthcare systems (through the cellular network), as well as from the healthcare system to emergency response teams on the move heading towards a patient’s location in case of detecting an emergency. The proposed solutions will be tailored to cater for the limitations of the IoT devices, in terms of power consumption and processing power, as well as their reliance on backscatter transmission, while ensuring a high-speed delivery of the patient data over the wireless medium.

➢ **S. Misra** is currently the PI of the ongoing project funded by Science and Engineering Research Board (SERB), India.

**Title:** *Unified Software-Defined Architecture for Industrial Internet of Things*.

The project aims to design and develop a holistic SDN based IoT architecture for smart industrial use-cases with better efficiency and optimization.

➢ **S. Otoum** is the PI of the project funded by the **CTI Zayed University, UAE**.

**Title:** *Leveraging Futuristic Technologies for Securing Smart Cities Networks in the era of 6G and beyond!*

Futuristic technologies such as machine, federated, and distributed Learning, and Blockchain are revolutionizing the system security solutions for their endless benefits of enhancing the system’s intelligence and speed up the computation process. This project will directly focus on three essential aspects of Smart Cities Networks security that will not only leverage cutting-edge research techniques but also help in speeding up the realization of smart cities. Moreover, blockchain technology is a key driver in communication and data security, and trust management. Furthermore, it also focuses on ultra-lightweight cryptography for privacy and trust in such an environment.
Past Events

➢ **J. Ben Othman** has chaired the **12th EAI International Conference on Ad Hoc Networks (AdHocNets2020)** which took place as a virtual event from November 17-18, 2020.

Due to the safety concerns and travel restrictions caused by COVID-19, EAI ADHOCNETS 2020 will take place online in a live stream. Participants will still be able to enjoy unique interactive benefits – [learn more](https://www.ieee-ukandireland.org/wp-content/uploads/2020/10/Blockchain-Mubashir-Rehmani.pdf).

➢ **M. H. Rehmani** delivered a webinar on **Cognitive Radio Networks and Blockchain** in IEEE UK and Ireland Section on 06th Nov 2020. 

➢ M. H. Rehmani managed a SI in *IEEE Vehicular Technology Society Magazine* on "AI-Driven Cybersecurity Threats" with Sidi-Mohammed Senouci, Sedjelmaci Hichem, JiaJia Liu, and Elias Bou-Harb.
Upcoming Events

Conferences and Workshops


The International Wireless Communications and Mobile Computing Conference (IWCMC 2021) will be held in Harbin, China, June 28 - July 2, 2021 under the theme of "Communications with Intelligence". IWCMC 2021 will target a wide spectrum of the state-of-the-art as well as emerging topics pertaining to various networks, wireless communications, and mobile computing. Continuing the great success of previous IWCMC events, IWCMC 2021 is anticipated to attract a large number of high-quality submissions and stimulate the cutting-edge research discussions among many academic pioneering researchers, scientists and industrial engineers leaders from all around the world.

The IWCMC 2021 program will feature a number of symposia, workshops, invited presentations, special sessions, and pioneering keynote speakers. More information can be found at the conference website: http://iwcmc.org/2021. Prospective authors are invited to submit original technical papers—up to 8 pages of text, using the EDAS link: https://edas.info/newPaper.php?c=27588 to various IWCMC 2021 symposia and workshops, as listed in the conference website for possible publication in the IWCMC 2021 Conference Proceedings, which will be submitted to the IEEE Digital Library. Selected papers will be further considered for possible publication in one of the special issues of the following journals:

- IEEE Journal of Wireless Communications & Mobile Computing (JWCMC)
- The International Journal of Sensor Networks (IJSN)
- International Journal of Autonomous and Adaptive Communications Systems
- IEEE Transactions on Neural and Information Systems
- Peer-to-Peer Networking & Applications
- Sensors

There will also be best paper award, one best symposium award, and one best Workshop award.

Technically Sponsored by:
➢ The 4th International Workshop on **Intelligent Transportation and Autonomous Vehicles Technologies** (ITAVT 2021),

General Co-Chairs:
Dr. Moayad Aloqaily, xAnalytics Inc., Canada
Prof. Öznur Özkasap, Koç University, Istanbul, Turkey

➢ The Workshop on **Applications of Affective Sensing in Communication Networks**, 
   When: June 14-18, 2021 | Where: Montreal, Canada | Website: [https://www.affecticom.net/](https://www.affecticom.net/) 
   co-located with the IEEE International Conference on Communications (ICC2021)

**Organizers**
Abd-Elhamid M. Taha, Alfaisal University
Najah Abu Ali, United Arab Emirates University
Ajjen Joshi, Affectiva
Shuai Han, Harbin Institute of Technology
➢ The 7th IEEE International Workshop on Communication, Computing, and Networking in Cyber-Physical Systems (CCNCPS),
When: June 14-18, 2021 | Where: Montreal, Canada | Website: 
https://sites.google.com/site/ccncps/
co-located with the IEEE International Conference on Communications (ICC2021)

Workshop co-chairs
- Amjad Gawanmeh, University of Dubai, UAE, and Concordia University, Montreal Canada.
- Joel Rodrigues, Federal University of Piauí, Teresina - PI, Brazil; Instituto de Telecomunicações, Portugal.

➢ The First International Workshop on Securing Next-Generation Connected Healthcare Systems using Futuristic Technologies,
When: 8-11 March 2021 | Where: Lübeck, Germany | Website: 
co-located with the IEEE International Conference on Networked Systems (2021)

Workshop co-chairs
- Safa Otoum and Omar Alfandi, College of Technological Innovation, Zayed University, Abu Dhabi, UAE.
Special Issues

The CommSoft TC members are active in organizing SIs in several reputable journals. In addition to the SIs, listed in the SIG Section, organized by M. Erol-Kantarci (IEEE Network and IEEE Transactions on Green Communications and Networking) and M. Aloqaily (Computer Networks), we are happy to share the following SIs as well:

➢ **Dr. A. Erbad** is a guest editor in the journal *Frontiers in Communications and Networks* for the special issue “AI-powered IoT for Intelligent Systems and Smart Applications”.

For more information visit: [https://www.frontiersin.org/research-topics/15144/ai-powered-iot-for-intelligent-systems-and-smart-applications](https://www.frontiersin.org/research-topics/15144/ai-powered-iot-for-intelligent-systems-and-smart-applications)

➢ **Dr. A. H. Taha** is a guest editor in the *Journal of Sensors and Actuator Networks* (JNSA), MDPI, for the special issue “5G and Beyond towards Enhancing Our Future”.

For more information visit: [https://www.mdpi.com/journal/jsan/special_issues/5G_beyond](https://www.mdpi.com/journal/jsan/special_issues/5G_beyond)
➢ Dr. M. Aloqaily is a guest editor in the IEEE Wireless Communications Magazine, for the special issue “Empowering Sustainable Energy Infrastructures via AI-Assisted Wireless Communications”.

For more information visit:

➢ Dr. J. Ben Othman is a guest editor in the IEEE Networks Magazine, for the special issue “Ubiquitous IoT with integrated Space, Air, Ground, and Ocean Networks”.

For more information visit:
First LTE Service Delivered from a Fixed-Wing UAS in the Stratosphere

HAPS Mobile, a Soft Banks’ subsidiary have been developing a communications payload for their fixed-wing unmanned aerial system, named Sunglider (formerly HAWK30). The development is in partnership with Alphabet’s Loon, which also develops stratospheric balloons that successively delivered LTE coverage in a number of places such as Peru and Puerto Rico. The developed communications system was tested during test flights of Sunglider. The flight provided Internet connectivity to testers on the ground. The UAS can reach an altitude of 19 kilometers. The communication system provided LTE connectivity using LTE Band28, while it was connected to a core network through a gateway on the ground using a millimetre-wave link. A high-definition video call was performed between team members in the USA and Japan using regular cell phones.

Sources:

Apple, Google, and LG join a 6G Industry Group

Apple, Google and LG have joined an industry group named the Next G Alliance which works towards 6G development. The group was recently formed by the Alliance for Telecommunications Industry Solutions (ATIS). The 6G group focuses on advancing and strengthening the leadership of North American companies in 5G technologies and cultivating a path towards 6G development. The group includes major North American telecom and tech companies.

Source:
- https://www.cnet.com/news/apple-google-lg-join-industry-group-working-on-6g

ONF Announces an 5G SD-RAN Project

Back in August, the Open Networking Foundation (ONF) announced founding the SD-RAN project (stands for Software Defined Radio Access Network). The project aims to produce open-source software platforms for 4G and 5G RANs. The first goal of the project is developing a Near Real-Time RAN Intelligent Controller (nRT-RIC). The specific project is dubbed µONOS-RIC. µONOS-RIC is based on µONOS, a version of the ONOS SDN controller but based on the microservice architecture. According to the announcement, “µONOS-RIC is designed to control an array of multi-vendor open RAN equipment consistent with the O-RAN ALLIANCE architecture.” What is known as xApps will run on top of the controller and implement functionalities traditionally implemented in vendor-specific hardware.

Source:
COVID-19 Update

 ➢ COMSOC COVID-19 Related Research

Below are Covid19 Related Research from ComSoc Community.

*Source: [https://site.ieee.org/comsoc-comt/covid19-related-research/](https://site.ieee.org/comsoc-comt/covid19-related-research/)

1. Modeling and Controlling the Spread of COVID-19

*Vince Poor, Simon Levin (Princeton University), Joshua Plotkin (University of Pennsylvania), Osman Yagan (Carnegie Mellon University)*

A key scientific goal concerning COVID-19 is to develop mathematical models that help us to understand and predict its spreading behavior, as well as to provide guidelines on what can be done to limit its spread. With tight restrictions on human mobility and activity already in place in many jurisdictions, an important question will soon arise as to when these restrictions can be safely eliminated. To have educated answers to these questions, we need to

i) Analyze and predict the spread of COVID-19 through mathematical models incorporating virus mutations,

ii) Do optimal and robust control of the spread of COVID-19 by carefully-timed interventions.

Fortunately, both these goals are well within our scope of expertise as engineers.

We expect the outcomes of this research to provide authorities an input to better assess the effectiveness of existing or potential countermeasures in limiting the spread of COVID-19. They can also help leaders assess the outcomes of eliminating existing countermeasures. Finally, they will help us better prepare for different mutation scenarios including worst-cases (for the current or a future pandemic).

4. Engineering Vaccines

*Matthew McKay – Hong Kong University of Science and Technology*

What marks the “end” of the COVID-19 outbreak? What are we waiting for by staying at home? When will the public fear be relieved? If we ask these questions to the general public, the most wide-spread answer would probably be related to the development of a vaccine.

Throughout decades, virologists used a classical vaccine design methodology that aims to induce an immune response in the patient by injecting a weakened form of the virus. This strategy was obviously very successful, mitigating the effects of many dangerous and contagious diseases, even eradicating some. However, the classical approach has unfortunate shortcomings against viruses with rapid evolving natures (e.g. HIV). Furthermore, we may want to take quick and accurate action against rapidly emerging viruses, such as SARS-CoV-2. Prof. Matthew McKay of the Hong Kong University of Science and Technology aims to provide insights on structural properties -and hopefully vulnerabilities- of viruses through data analytics methods on the genetic sequence of viruses. In another article in the Viruses Journal, Prof. McKay’s group addresses the possibility of leveraging existing literature on the initial SARS outbreak of 2003 by characterizing the genetic similarity between SARS-CoV and SARS-CoV-2 viruses. The results of the study hints to promising points that could be exploited from a vaccine design point of view. Information regarding the obtained genetic data for the SARS-CoV-2 virus, alongside the immunological data of the 2003 SARS outbreak can be accessed through the COVIDep web platform developed by the group.
3. Contact Tracing and Virus Tracking

Privacy-sensitive mobile-based contact logging
Bhaskar Krishnamachari, University of Southern California

While the idea of digital mobile-device based contact tracing, using short-range radio signals to determine which individuals have been close to each other has been around for some time, and clearly useful in the context of the present COVID-19 pandemic, there is still not a wide and uniform acceptance of such tools, particularly in places where people have significant concerns about privacy. With a goal of establishing privacy-sensitive contact logging and exposure notification, we can invoke our knowledge from network theory and come up with protocols. Two of such protocols, for example, have been proposed by Prof. Krishnamachari at the University of Southern California, and are based on the beaconing and logging of anonymous (either encrypted or randomized) Bluetooth messages. Such endeavors are also in the scope of companies like Google and Apple. Methods based on signal strength and localization are essential in the contact tracing effort.

4. Using Drones to deliver disinfecting UV-light

Tara Javidi, UCSD

Prof. Tara Javidi of UCSD is working to use off-the-shelf drones adapted to carry UV lights to act as remote room disinfectors for the SARS-CoV-2 virus. UV-C light has shown promise in disinfecting viruses; however, a challenge is that such light can be harmful to human skin. Thus, such systems would need to be used in a remote fashion. The cleaning strategy is based on a new work by Javidi’s group on active hypothesis testing and decision making. Her methods have been effective in designing active methods for adapting mmWave antenna apertures to finding objects of interest in a scene.

5. Networking Technologies to Combat the COVID-19 Pandemic

Call for Papers

The COVID-19 pandemic has resulted in hundreds of thousands of deaths all over the world. This has strained the health care systems and economies of many countries and changed the way people live and work. In order to reduce the number of cases, social distancing, isolation and contact tracking have been widely deployed. Information and Communications Technologies (ICT) played major role in supporting our new lifestyle, involving self-quarantine, working from home, virtual conferencing, online education and remote patient monitoring. Data collection, processing and analytics, surveillance, contact tracing, and eHealth, are utilized to face, and control the impact of, the pandemic.

IEEE Communications Magazine