



## ◆ IEEE CyberScitech/DASC/PICOM/CBDCom 2023

### IEEE CyberSciTech/PICOM/DASC 2023 - A brief overview of the conference

We had a fantastic IEEE CyberSciTech/DASC/PICom/CBDCom 2023! We gathered together at the beautiful and modern Abu Dhabi. The conference was held at the ADNEC at the heart of the city.

We had a 4 day conference (November 14- 17) with several keynotes, papers and a lot of fun. Several simultaneous sessions - it was difficult to choose what to take a look at!

Thanks to our hosts from Mohamed bin Zayed University of Artificial Intelligence, Zayed University and the University of Dubai - Moayad Aloqaily, Ouns Bouachir, Safa Otoum and Amjad Gawanmeh,

The opening ceremony started on November 14<sup>th</sup> around 9 AM (Abu Dhabi time) and there was a speech from prof. Jianhua Ma. The speech was followed by messages from honorary chairs, general chair (prof. Aloqaily) and program chairs (prof.).

Some data about the event:

- 267 attendees
- 2 panels
- 5 special sessions
- 4 keynotes
- 37 sessions

Right after the Opening ceremony we started with the first Keynote.

We had several interesting and enticing talks. Each keynote was chosen by one of the conferences, so there was room for everyone to enjoy and learn. The panels were also interesting and full of insights.

**Keynote 1: Analyzing the Abyss: Constructing and Validating Results in Big Data Environments**



*Diya Salloum,*

Vice President of Fraud Risk at JPMorgan Chase

**Abstract:** In today's fast-paced business environment, ad-hoc analysis has become indispensable for organizations to make informed decisions swiftly. However, the spontaneity of these analyses can sometimes compromise their accuracy and efficiency. This presentation delves into the best big data analytical practices that ensure precision and save crucial time. We'll explore strategies like structured problem framing, leveraging templated workflows, and utilizing automated data validation tools. Additionally, the importance of fostering a culture of knowledge sharing and continuous learning will be highlighted, emphasizing the role of peer reviews and feedback loops. By integrating these best practices, analysts can confidently produce rapid yet robust insights, driving agile decision-making processes in any organization.

**Biography:** Diya Salloum is serving as the Vice President of Fraud Risk at JPMorgan Chase. Mr. Diya's current role focuses on combating digital fraud by analyzing fraud trends and designing innovative measures to protect customers. His deep understanding of big data, analytics, and the financial sector allows him to proactively address risks and ensure the security of customers and financial systems. Prior to that, Mr. Diya held a position as a Senior Business Analyst at Amazon Web Services (AWS).

**Keynote 2 - Metaverse (Extended Reality, Hologram Type and Mulsemedia) Communication Challenges In 6G and Beyond Systems**



**Ian F. Akyildiz,**

**Founder and President of Truva Inc. Advisory Board member at TII**

**Abstract:** Although the past several decades have seen significant progress in the development of multimedia sensor networks, the multimedia only stimulates sight and hearing, neglecting three other fundamental human senses, namely, touch, smell, and taste. In recent years, the emergence of extended reality (XR), digital twins, digital currency, holographic-type communication systems, and Metaverse, requires that all five human senses must be addressed and stimulated to create a fully immersive experience for users. Thus, MultiSensory media (MulSemedia) capturing all five senses will play a critical role for next generation sensor networks research in the next decade. This talk provides an overview of the history, background, use cases, existing research, devices, and standards of Metaverse. Additionally, the challenges in Metaverse research from the perspective of wireless networking are discussed. In particular, the research challenges, such as, integrated communication/sensing, mulsemmedia streaming, scheduling, intra- and inter synchronization, AI/ML algorithms with LLM (Large Language Models), semantic communication, security aspects are presented which will facilitate the design and commercialization of Metaverse. The potential of 6G wireless systems to address these challenges is highlighted, and several research directions that can advance Metaverse are identified.

**Biography** I.F. Akyildiz (Life Fellow, IEEE) received the B.S., M.S., and Ph.D. degrees in Electrical and Computer Engineering from the University of Erlangen-Nürnberg, Germany, in 1978, 1981, and 1984, respectively. He is also Founder and President of Truva Inc., a consulting company based in Georgia, USA, since 1989. He is an Advisory Board member at the Technology Innovation Institute (TII) Abu Dhabi, United Arab Emirates, since June 2020. He is the Founder and the Editor-in-Chief of the newly established International Telecommunication Union Journal on Future and Evolving



Technologies (ITU J-FET) since August 2020. He served as the Ken Byers Chair Professor in Telecommunications, the Past Chair of the Telecom Group at the ECE, and the Director of the Broadband Wireless Networking Laboratory, Georgia Institute of Technology, from 1985 to 2020. He had many international affiliations during his career and established research centers in Spain, South Africa, Finland, Saudi Arabia, Germany, Russia, India and Cyprus. Dr. Akyildiz is an IEEE Fellow since 1996, and ACM Fellow since 1997. He received numerous awards from IEEE, ACM, and other professional organizations, including Humboldt Award from Germany and Tubitak Award from Turkey. In June 2022, according to Google Scholar his h-index is 133 and the total number of citations to his articles is more than 134+K. His current research interests include Networking 2030, Hologram and Extended Reality Communication, 6G/7G wireless systems, Terahertz Communication, Underwater Communication.

### **A Panel - Beyond the Hype: The Rise and Impact of Edge Intelligence**

The panel was one of the peaks of the conference and with several members of the Hyper-Intelligence Workgroup. It helped to highlight the importance of the Edge Intelligence field in the next few years. It discussed a broad aspect of topics from the concept of Intelligence itself to how to achieve Edge Intelligence and its new trends. It was an enlightening discussion and at the end we just wanted to have more time with it.



### **Panel Moderators:**

- Feras M. Awaysheh, University of Tartu, Delat research center, Tartu, Estonia
- Flavia C. Delicato, Fluminense Federal University, Brazil

Panel Speakers:

- ✧ Paulo Pires, Dell Research Office and Fluminense Federal University, Brazil
- ✧ Deepak Puthal, Khalifa University, UAE
- ✧ Giancarlo Fortino, University of Calabria, Italy

The digital world is rapidly evolving, and with it comes a surge in the volume and complexity of data being generated. Traditional centralized computing systems often grapple with latency issues and resource constraints when handling such vast datasets, not to mention data privacy. Enter Edge Intelligence, a paradigm shift towards processing data closer to its source, ensuring faster response times, efficient resource utilization, and data privacy. This panel discussion brings together experts to dissect the myriad facets of edge intelligence. Namely, this panel discussion will host four experts to provide insights on deploying a reliable and privacy-preserving edge intelligence solution from leading academic practitioners and industry partners. Discussions will also encompass challenges in implementing edge intelligence, including data security concerns, infrastructure demands, and seamless integration with the existing Edge-fog-cloud continuum. This discussion will offer attendees a deep dive into the future potential of edge intelligence, its scalability, and how it is poised to revolutionize data-driven applications.

Keynote 3 - Edge Computing Enabling Clinical Information Processing

*Albert Y. Zomaya,*

Centre for Distributed & High-Performance Computing, School of Computer Science  
University of Sydney, Australia

**Abstract:** The healthcare industry increasingly relies on the analysis of clinical information to provide accurate and timely diagnosis and treatment plans for patients. However, traditional methods of processing and analyzing this information can be slow and resource intensive, leading to delays in patient care and suboptimal outcomes. This is where edge computing comes in, providing a way to process and analyze clinical information at the point of care, improving the speed and accuracy of decision-making.

In this talk, we will explore how edge computing can break down barriers in clinical information processing, leading to improved patient outcomes. We will examine the healthcare industry's key challenges in clinical information processing and how edge computing can help overcome these challenges through faster data processing, increased data privacy and security, and improved decision-making capabilities.

We will also explore how edge computing can be integrated with other emerging technologies, such as machine learning and the Internet of Things, to provide even greater benefits for patients and healthcare providers. Ultimately, this talk will provide valuable insights into how edge computing is transforming the healthcare industry and what it means for the future of patient care.

**Biography:** Albert Y. ZOMAYA is Peter Nicol Russell Chair Professor of Computer Science and Director of the Centre for Distributed and High-Performance Computing at the University of Sydney. To date, he has published > 700 scientific papers and articles and is (co-) author/editor of >30 books. A sought-after speaker, he has delivered >250 keynote addresses, invited seminars, and media briefings. He is a past Editor in Chief of the IEEE Transactions on Computers (2010-2014) and the IEEE Transactions on Sustainable Computing (2016-2020), and currently serves as the Editor in Chief of the ACM Computing Surveys

### **A Panel - Security of LLMs: Protecting the Future of LLMs**

This panel helped to highlight the importance of the Large Language Models in the next few years. It discussed a broad aspect of topics from the concept of Intelligence itself to how to achieve Edge Intelligence and its new trends. It was an enlightening discussion and at the end we just wanted to have more time with it.

Moderator:

- Moayad Aloqaily, MBZUAI, UAE

Panelists:

- Mohsen Guizani, MBZUAI, UAE
- Ernesto Damiani, Khalifah University, UAE
- Saed Alrabaa, UAEU, UAE

Abstract:

The proliferation of Large Language Models (LLMs) has revolutionized natural language processing, enabling breakthroughs in various domains. However, this transformative technology also presents significant security challenges. This panel aims to explore the multifaceted issue of LLM security, delving into the risks, vulnerabilities, and countermeasures essential for safeguarding the future of LLMs. The panel will bring together experts from academia, industry, and cybersecurity to engage in a comprehensive discussion on the security implications of LLMs. Key topics to be covered include:

- Threat Landscape: Understanding the diverse threats that LLMs face, such as misinformation generation, deep fake content, adversarial attacks, and data privacy breaches.

- **Vulnerabilities:** Identifying the inherent weaknesses in LLMs, such as biases, explainability issues, and the potential for unethical use.
- **Ethical Considerations:** Discussing the ethical dimensions of LLM security and the responsibility of developers, users, and policymakers in ensuring responsible AI usage.
- **Countermeasures:** Exploring the strategies and technologies for enhancing the security of LLMs, including robustness testing, model interpretability, and responsible AI guidelines.

The panel's insights will be valuable for researchers, policymakers, and industry professionals seeking to secure the continued development and deployment of LLMs while upholding ethical and responsible AI practices. Join us for a thought-provoking discussion on the security of LLMs, as we work collectively to protect the future of this transformative technology.

#### **Keynote 4 - Distributed and Hybrid Digital Twins for Ultra Low Latency CPS Applications**



***Paolo Bellavista,***

Professor, AEiC of IEEE COMST, EiC of MDPI Computers EB Member of IEEE TNSM & TSC, ACM CSUR & TIOT, Elsevier PMC & JNCA DISI - University of Bologna, Italy

**Abstract:** Digital twins are becoming a crucial tool for both design purposes (e.g., dimensioning before implementation – offline digital twins) and efficiency goals (e.g., online reconfiguration to improve quality – online digital twins), by posing several, still open, technical challenges to their effective implementation. In particular, the keynote speech will focus on the emerging directions of hybrid (synergically exploiting simulations and data-driven machine learning models) and distributed (running also in cloud continuum edge nodes, e.g., for federated learning and efficient after-training operations) digital twins. Practical examples of implemented testbeds with edge cloud nodes supporting digital twins will be described from the IoTwins H2020 project, in the vertical domains of industrial manufacturing plants and smart city management optimization.

**Biography:** Paolo Bellavista is a Full Professor of mobile and distributed systems at the University of Bologna, Italy. His primary research interests include middleware for mobile computing, digital twins for Industry 4.0 and smart city applications, QoS management in the cloud continuum, infrastructures for big data processing in industrial environments, and performance optimization in wide-scale and latency-sensitive deployment scenarios. Related to digital twins, he was the scientific



coordinator of the H2020 IoTwins project (completed in Winter 2022). Additional details at <https://www.unibo.it/sitoweb/paolo.bellavista/en>

### Closing Ceremony

Unfortunately things cannot last forever and so our meeting had to come to an end. After 4 days of discussion, presentations and overall fun - we had to close to prepare for a new cycle. But not before celebrating those who exceeded our expectations. We had several amazing papers this year and it was hard to choose the best. We awarded both the best paper and the best student paper.

Also we could not forget the work of all the amazing people that helped the conference on a daily basis - a special thanks was reserved for all the session chairs, workshop chairs, program chairs and the organization in general.



### Best Paper Awards Announcements

- **PICOM -**

Chuan-Yu Chang, Xin-Hui Lin and Hui-Huang Hsu - **Infant Vomit Detection Using**

**ShuffleNetV2**

Emily Kouzaridi, Harris Partaourides, Nicolas Tsapatsoulis and Constantinos Djouvas



**Assessing the importance of key terms in UN SDGs through Citizens Labs**

- **DASC -**

Tagnon Privael Okoumassoun, Ismaeel Al Ridhawi, Ali Abbas - **Blockchain-Enabled SAGIN Communication for Disaster Prediction and Management**

Jaouhara Bouamama, Yahya Benkaouz and Mohammed Ouzzif - **EdgeSA: Secure Aggregation for Privacy-Preserving Federated Learning in Edge Computing**

- **CDBCOM -**

Belal Mohammed, Ahmed Awad, and Mohamed Elhelw - **Towards Scalable Process Mining Pipelines**

Carson Leung - **Efficient Vertical Mining of Frequent Quantitative Patterns**

- **CyberSciTech -**

Boqian Fu, Fahao Chen, Peng Li and Zhou Su - **Efficient Scheduling for Multi-Job Federated Learning Systems with Client Sharing**

Qian Liu, Yan Chen, Zhixiong Chen, Ximeng Liu and Hui Lin - **New cryptographic bent functions from permutations and linear translator in cyber security**

Jierui Jin, Jie Zhang, Xiaolong Xu, Ke Meng, Xiaokang Zhou, Lianyong Qi, Xuyun Zhang and Wanchun Dou - **Federated Learning Based Satellite-Marine Integrated Training for Marine Edge Intelligence**

As one cycle ends another begins, so we start to plan next year's conference. In 2024, we are going to the Philippines with prof. Bernady O. Apduhan (Bob) as General Chair.

Some details to prepare you for what is coming next year:

**IEEE CyberSciTech/DASC/PICom/CBDCOM 2024 - Boracay Island - Philippines**

General Chair: **Bernady O. Apduhan (Bob)** - Kyushu Sangyo University - Japan



Planning :

- 3/4 Keynote speakers
- Workshops
- 2-5 Special Sessions
- 1 Panel on Industry/Research hot issues
- Demo sessions during coffee breaks
- Special Issue in ISI-impacted Journals

**Conference Venue:** The conference will be held at the beautiful Boracay Island in the Philippines, one of the top beach destinations in Asia. Boracay Island is known for its powder white sand, water activities and vibrant nightlife. The island has a wide variety of Hotels/Accommodations. It will be an Island adventure! An approximate date is November 5 - 8.

So as this year's conference came to an end, we would like to take a moment to remember and appreciate all the amazing people that took part. Without the efforts of a huge group of dedicated researchers and attendees this conference - actually any conference - would be possible. So, we - the IEEE Hyper-Intelligence workgroup - would like to wish you Happy Holidays and we hope to see you next year.

