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To:
– ITU Member States
– ITU Sector Members, Associates, Academia and relevant international, regional and national organizations

Subject: ITU Kaleidoscope 2022 - Extended reality – How to boost quality of experience and interoperability, Accra, Ghana (7-9 December 2022)

Dear Sir/Madam,

1 As part of the Kaleidoscope series of conferences, an initiative of the International Telecommunication Union (ITU) to increase cooperation with academia and research institutions, I am pleased to inform you about the fourteenth in a series of forward-looking academic conferences that aim to identify emerging developments in information and communication technologies (ICTs) and, in particular, areas in need of international standards to aid the sustainable development of our interconnected world. *Extended reality – How to boost quality of experience and interoperability* will be held in Accra, Ghana from 7-9 December 2022.

2 *Kaleidoscope 2022* calls for original academic papers sharing insight into ongoing projects and research relevant to the development and widespread adoption of extended realities, as well as new possibilities and associated challenges appearing on the horizon. In particular, **this conference encourages submissions on how standards can help boost quality of experience and interoperability in extended realities**. The full text of the call for papers may be found in **Annex 1**. The deadline for submissions is **20 June 2022**.

3 Participation is open to ITU Member States, Sector Members, Associates and Academic Institutions and to any individual from a country which is a member of ITU who wishes to contribute to the work. This includes individuals who are also members of international, regional and national organizations. The event is free of charge.

4 We encourage all ITU members to promote this event within the research community of their countries.

5 Detailed information concerning registration and logistics will be available on the event's webpage, <http://itu.int/go/K-2022>, closer to the date of the conference. Please note that pre-registration of participants for this event will be carried out exclusively online.

Yours faithfully,

(signed)

Houlin Zhao
Secretary-General

Annex: 1

14TH ITU ACADEMIC CONFERENCE

ITU KALEIDOSCOPE ACCRA2022

*Extended reality – How to boost
quality of experience and interoperability*

7-9 December 2022
Accra, Ghana

CALL FOR PAPERS

Hosted by



aiti ADVANCED
INFORMATION
TECHNOLOGY
INSTITUTE
GHANA-INDIA KOFI ANNAN CENTRE OF EXCELLENCE IN ICT

Organized by



ITU KALEIDOSCOPE

Kaleidoscope 2022 “Extended reality – How to boost quality of experience and interoperability” is the fourteenth in a series of peer-reviewed academic conferences organized by ITU to bring together a wide range of views from universities, industry and research institutions. The aim of the Kaleidoscope conferences is to identify emerging developments in information and communication technologies (ICTs) and, in particular, areas in need of international standards to aid the sustainable development of our interconnected world.

Call for papers

Theme

In a world where digital transformation continues to expand, immersive technologies that merge physical and virtual worlds are becoming more popular for their potential to improve our quality of life, explore new social and cultural dimensions, and unlock new business opportunities.

These technologies are known under the umbrella term of extended reality (XR), which includes forms of augmented reality (AR), mixed reality (MR), and virtual reality (VR). The promise of the metaverse, a term that recently gained attention, is to allow an even greater overlap of our digital and physical lives.

Despite remarkable technological advances, current XR applications are a largely individual and local experience. To deliver a widespread adoption of XR type of services and applications and achieve the vision of a metaverse, communication networks have a key role to play.

Which new technological advances in wireless network communications are needed to meet the low latency and high reliable requirements to support these immersive applications and services, and to ensure the best quality of experience for users in these conditions? Which solutions would be required to address power consumption and power-saving considerations? Which network communication standards and protocols can bring a significant contribution to foster interoperability among different platforms and providers? These are some of the questions that this conference aims to address.

Objective

Kaleidoscope 2022 calls for original academic papers sharing insight into ongoing projects and research relevant to the development and widespread adoption of extended realities, as well as new possibilities and associated challenges appearing on the horizon. Particularly, **this conference encourages submissions on how standards can help boost quality of experience and interoperability in extended realities.**

Audience

Kaleidoscope 2022 targets specialists in the fields of ICT and socio-economic development, including researchers, academics, students, engineers, policymakers, regulators and innovators.

Date and venue

Kaleidoscope 2022 will be held from 7-9 December at the Ghana-India Kofi Annan Centre of Excellence in ICT, Accra, Ghana.

Suggested (non-exclusive) list of topics

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- Track 1:**
Network infrastructure and architecture enabling ubiquitous communications
- Design, requirements, architectures and protocols for immersive systems
 - System architectures for augmented reality (AR), mixed reality (MR), virtual reality (VR), extended reality (XR), and immersive live experience (ILE)
 - Future mobile and wireless communications (5G and beyond)
 - Networking and multimode connectivity
 - Integration/exchangeability of processing storage and communication
 - Real-time performance and network latency aspects
- Track 2:**
New applications and services
- Ubiquitous communications in arts, gaming, leisure, sports and in the media
 - Immersive live experience in business, education, information, healthcare, commerce and entertainment
 - Evolution of manufacturing and industrial production systems
 - Urban/geo planning and ecosystem services
 - Applications and services of new Web technologies (Web3.0)
- Track 3:**
Enabling technologies
- Artificial intelligence (AI) and machine learning
 - Data processing and management
 - Interoperability
 - Video coding and streaming
 - Omnidirectional, 360-deg, immersive video, spatial audio
 - Conversational and speech interfaces
 - Visualization techniques, display technologies (e.g. head-mounted displays, eyewear, smart watches, projectors)
 - Touch, tangible and gesture interfaces
 - Digital twins, spatial computing
 - Multimodal input and output, localization, spatial registration and tracking
 - Quality of experience (QoE) aspects and assessment
- Track 4:**
Security, privacy and trust
- Security architectures, trust, identity management, privacy protection mechanisms
 - The ergonomics of cyberattacks and security threats
 - Emerging privacy and security threats in cyber spaces
 - Threat models and attack strategies
 - Security applications and management
 - Distributed ledger technology, non-fungible token (NFT)
- Track 5:**
Socio-economic and ethical aspects
- Standards, regulations and policies
 - Evolution of standardization for AR, MR, VR, XR, ILE
 - Ethical and legal issues in the new realities
 - Socio-economic implications

Submission of papers

Prospective authors from ITU Member States are invited to submit full, original papers. The submission should be within eight pages, including a summary and references, using the template available on the conference's website. All papers will go through a double-blind peer-review process. Submission must be made electronically; see <http://itu.int/go/K-2022>, author's corner, for more details on online submission (EDAS). Paper proposals will be evaluated according to content, originality, clarity, relevance to the conference's theme and, in particular, **significance to future standards**.

Deadlines

- Submission of full paper proposals: **20 June 2022**
- Notification of paper acceptance: **30 September 2022**
- Submission of camera-ready accepted papers: **21 October 2022**

Awards

A prize fund totaling CHF 6 000.- will be shared among the authors of the three best papers, as judged by the Steering and Technical Programme Committees. Authors are strongly recommended to make explicit in their paper, and in their presentation at the conference, how their research work is relevant to the conference theme and to future standards, as these criteria carry more weight in the award selection. Young authors of up to 30 years of age presenting accepted papers will receive Young Author Recognition certificates.

Keywords

Information and communication technologies (ICTs), standards, interoperability, quality of experience (QoE), digital transformation, 5G and beyond networks, ultra-low latency, resilience, reliability, augmented reality (AR), mixed reality (MR), virtual reality (VR), extended reality (XR), immersive live experience (ILE), spatial computing, smart systems, cyber physical systems (CPS), digital twins, metaverse, avatars, data privacy, information security, cyber threats and attacks, trustworthiness, blockchain.

Publication and presentation

Accepted and presented papers will be published in the Conference Proceedings. In addition, extended versions of selected papers might be considered for publication in international journals.

Technical Programme Committee

- Chairman: **Mostafa Hashem Sherif**, Consultant, United States

The Technical Programme Committee is composed of international ICT experts. Details are available at: <https://www.itu.int/en/ITU-T/academia/kaleidoscope/2022/Pages/techprogcom.aspx>.

Additional information

For additional information, please visit the conference website: <http://itu.int/go/K-2022>. Inquiries should be addressed to Alessia Magliarditi at kaleidoscope@itu.int.

General Chairman

- **Collins Yeboah-Afari**, Director-General, Ghana-India Kofi Annan Centre of Excellence in ICT (AITI-KACE), Accra, Ghana

Steering Committee

- **Christoph Dosch**, ITU-R Study Group 6 Vice-Chairman; ARD, Germany
- **Eva Ibarrola**, University of the Basque Country, Spain
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- **Gyu Myoung Lee**, Liverpool John Moores University, United Kingdom
- **Tiziana Margaria**, University of Limerick, Ireland
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- **Kwame Baah-Acheamfuor**, Ministry of Communications and Digitalisation, Accra, Ghana