14TH ITU ACADEMIC CONFERENCE

ITU KALEIDOSCOPE ACCRA 2022

Closing and Awards Ceremony

7-9 December 2022
Accra, Ghana

Alessia Magliarditi

ITU Kaleidoscope Coordinator

ITU KALEIDOSCOPE ACCRA2022

Conference Proceedings

http://itu.int/go/K-2022

Direct link:

https://www.itu.int/pub/T-PROC-KALEI-2022

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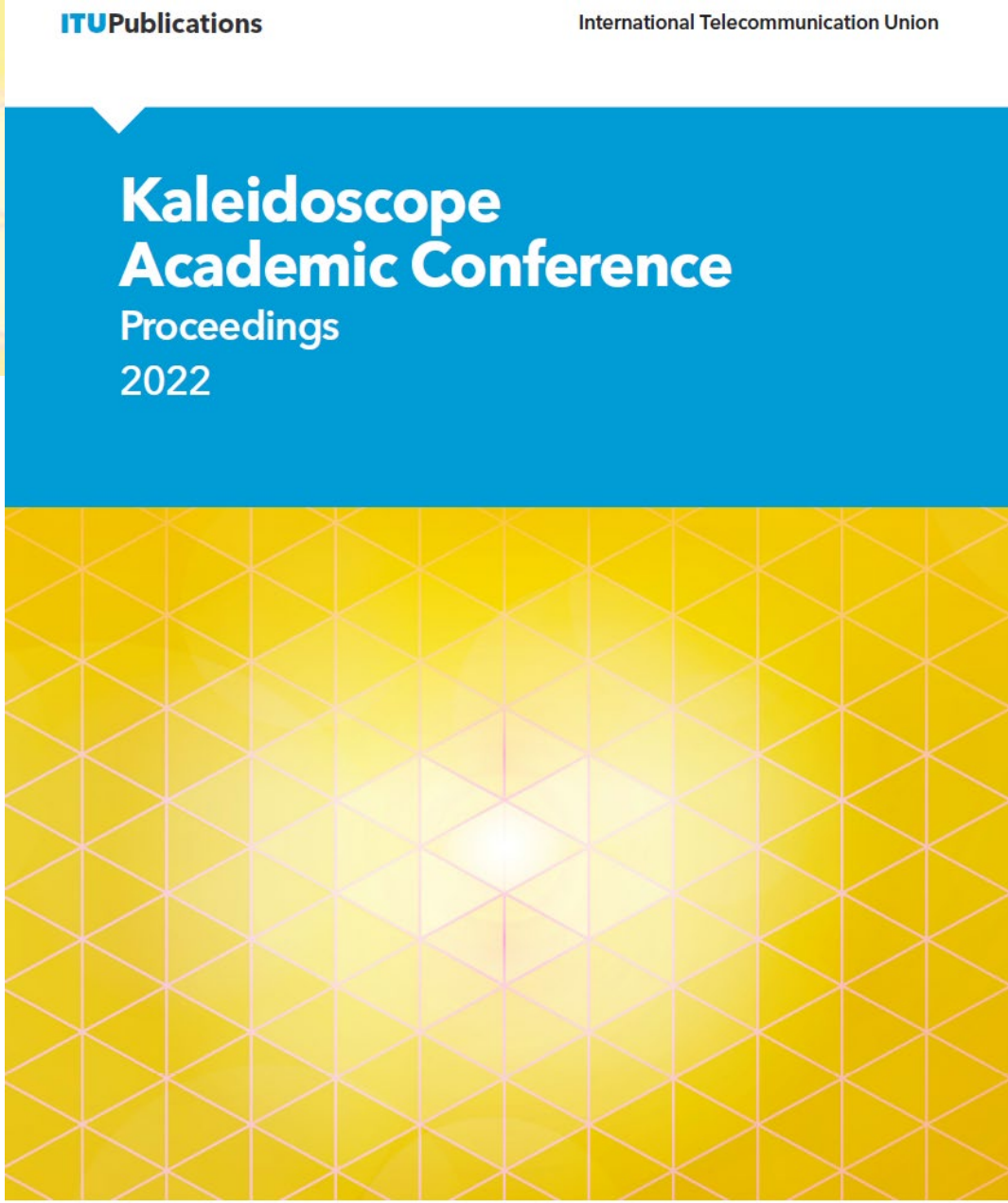

Kaleidoscope features in the

IEEE Communications Standards Magazine

ITU KALEIDOSCOPE ACCRA2022

SERIES EDITORIAL

Selected Papers from the Eleventh ITU Kaleidoscope Academic Conference

Mostafa Hashem Sherif | Kai Jakobs | Christoph Dosch | Alessia Magliarditi | Yoshitoshi Murata

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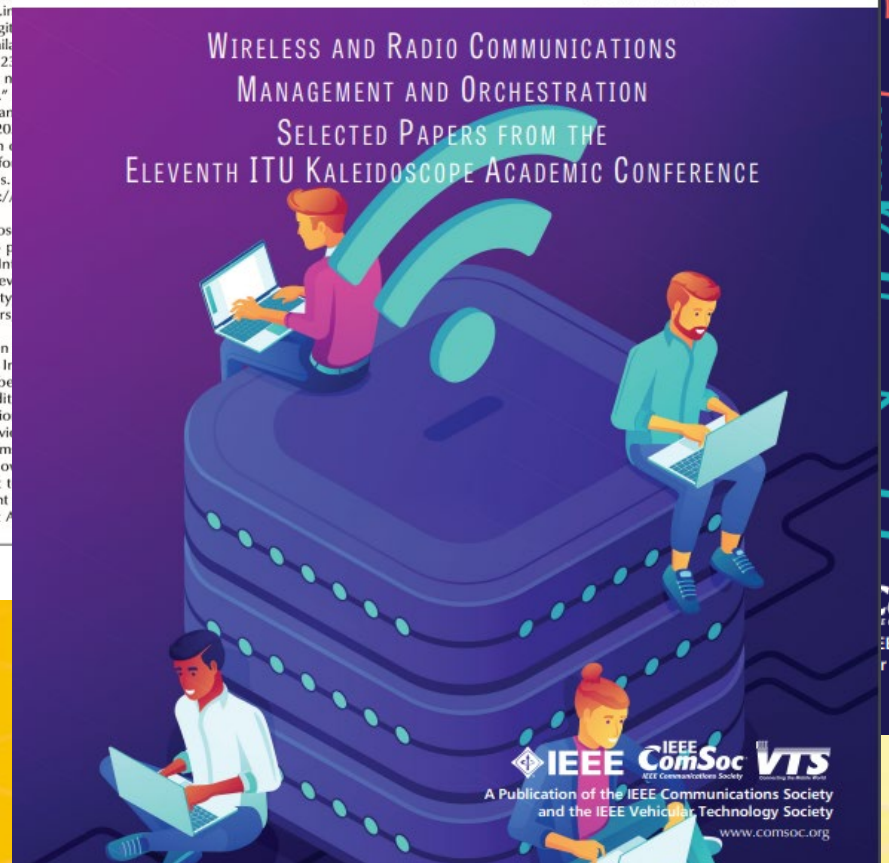
IEEE COMMUNICATIONS STANDARDS MAGAZINE
SEPTEMBER 2020, VOL. 4, NO. 3

WIRELESS AND RADIO COMMUNICATIONS MANAGEMENT AND ORCHESTRATION
SELECTED PAPERS FROM THE ELEVENTH ITU KALEIDOSCOPE ACADEMIC CONFERENCE



IEEE ComSoc VTS
A Publication of the IEEE Communications Society and the IEEE Vehicular Technology Society
www.comsoc.org

IEEE COMMUNICATIONS STANDARDS MAGAZINE
SEPTEMBER 2021, VOL. 5, NO. 3

EMERGING SECURITY TECHNOLOGIES FOR 6
SECURITY AND PRIVACY

IEEE ComSoc VTS
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r Technology Society

KALEIDOSCOPE

Best Paper from the Twelfth ITU Kaleidoscope Academic Conference

Mostafa Hashem Sherif | Kai Jakobs | Christoph Dosch | Alessia Magliarditi | Yoshitoshi Murata

This special section presents an updated version of the paper that won the first prize award in the ITU (International Telecommunication Union) Kaleidoscope conference (K-2020).

This conference was the twelfth in the series, this time focusing on "Industry-driven digital transformation." The conference was technically co-sponsored by the Institute of Electrical and Electronics Engineers (IEEE) and the IEEE Communications Society (IEEE ComSoc). In addition, the IEEE Technology and Engineering Management Society (TEMS) also gave its support.

Initially, the plan was to hold the conference in parallel with the ITU Digital World, formerly known as ITU Telecom World, in Hanoi, Vietnam from 6 to 10 September 2020. The Covid-19 pandemic forced a change in plans, so the conference was held online later in the year, from 7 to 11 December 2020. To accommodate various time zones, the daily proceedings were limited to about four hours and the conference was stretched to five days instead of the original three. With all these changes, the 2020 Kaleidoscope was an opportunity to experiment with on-line conferencing and socializing. In particular, the ITU tool/platform, MyMeetings, provided a matchmaking function to give participants with similar interests the possibility of interacting online. Breakout rooms were arranged in the form of "virtual coffee breaks" for smaller group interactions. During these breaks, participants could move freely from one room to another. The Mystery Coffee tool (https://www.mysterycoffee.com) was also available for participants to partake in randomly arranged one-on-one virtual meetings. Each day, the ITU staff held a training session and remained available throughout to answer queries and provide assistance.

The on-line conferencing format allowed the participation of those who would not have afforded the cost of travel. In fact, there were about 150 participants connecting from 41 countries spread around the globe. Yet, the experience confirmed that online conferences cannot replace face-to face events, because the spontaneity and camaraderie of physical presence were sorely missed.

As described in the conference report (https://www.itu.int/en/ITU-T/academia/kaleidoscope/2020/Documents/Final%20Report/K-2020_Final-Report.pdf), the authors of the award-winning papers shared the prize fund of CHF 6 000.

The paper, "Network Control and Management Automation: Architecture Standardization Perspective," is an updated version of the winning paper presented at the conference. The latter was co-authored by Ved Kafle and AbuHena Al Muktadir under the title "Automation of Computational Resource Control of Cyber-physical Systems with Machine Learning." Ved P. Kafle is also the principal author of the revised paper with colleagues from the National Institute of Information and Communications Technology, Tokyo, Japan: Takahiro Hirayama, Takaya Miyazawa, Masahiro Jibiki and Hiroaki Harai. As requested at the conference, the revision covers the standardization of artificial intelligence (AI) and machine learning (ML) techniques currently in progress in several standards development organizations (SDOs) such as the ITU, the European Telecommunications Standards Institute (ETSI), and the 3rd Generation Partnership Project (3GPPP). A set of related open issues are also presented.

In conclusion, we would like to thank the reviewers listed below for their assistance.

Demo Souza, Richard
Federal University of Santa Catarina, Brazil
Gyu Myoung Lee, Myoung
Liverpool John Moores University, United Kingdom;
KAIST Institute for IT Convergence, Korea
Kassab, Rahif
King's College London, United Kingdom
Ko, Namseok
ETRI, Korea
Noboro Tominaga, Eduardo
University of Oulu, Finland
Skarmeta, Antonio
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Yang, Peng
Singapore University of Technology and Design, Singapore

Kaleidoscope 2022 special edition in the IEEE Communications Standards Magazine

For submissions:

1. Please read the guidelines: https://www.comsoc.org/publications/magazines/ieee-communications-standards-magazine/author-guidelines

2. Please go to https://mc.manuscriptcentral.com/m-comstd

Deadline: **10 March 2023**
Contact: **Mostafa Hashem Sherif** – Kaleidoscope TPC Chair

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AWARD CEREMONY

ITU KALEIDOSCOPE ACCRA 2022

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5) **Martin Mabeifam Ujakpa**, Ghana Communication Technology University, Ghana
6) **Abdul-Rahman Ahmed**, Kwame Nkrumah University of Science and Technology, Ghana

ITU KALEIDOSCOPE ACCRA2022

FOUR NOMINEES

- Best ranking papers that were recommended for best paper award by the Technical Programme Committee (double-blind/peer-review process) and Steering Committee.

- **Four candidates**
  - One in **Track 1** (Network infrastructure and architecture enabling ubiquitous communications)
  - One in **Track 2** (New applications and services)
  - Two in **Track 3** (Enabling technologies)

Call for Papers

Suggested (non-exclusive) list of topics

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, healthc 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 displa 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

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NOMINATED PAPERS AND PRESENTERS

S2.1 A framework for the design, implementation and evaluation of a multi-variant Augmented Reality Application
Sophie Westfahl (University of Applied Sciences Neu-Ulm, Germany); Dany Meyer-Renner (University of Applied Sciences Neu-Ulm, Germany); Antoine Bagula (University of the Western Cape, South Africa)

S2.2 Enhancing user experience in pedestrian navigation based on Augmented Reality and landmark recognition
Dhananjay Kumar, Shreayaas Iyer, Easwar Raja and Ragul Kumar (Anna University, MIT Campus, Chennai, India); Ved P. Kafle (National Institute of Information and Communications Technology, Japan)

S2.3 The knowledge graph as the interoperability foundation for an Augmented Reality application: The case at the Dutch Land Registry
Alexandra Rowland and Erwin J.A. Folmer (University of Twente & Kadaster, The Netherlands); Tony Baving (Kadaster, The Netherlands)

S3.3 A comparative analysis of Augmented Reality frameworks aimed at diverse computing Applications
Mfundo A. Maneli and Omowunmi E. Isafiade (University of the Western Cape, South Africa)

CRITERIA

- 1 – Clarity
- 2 – Relevance to the conference theme
- 3 – Significance to future standards

- 4 – Presentation

BEST PAPER AWARDS

- **First paper**: ITU Certificate + CHF 3 000.-
- **Second paper**: ITU Certificate + CHF 2 000.-
- **Third paper**: ITU Certificate + CHF 1 000.-

And the winners are…

ITU KALEIDOSCOPE ACCRA 2022

3rd BEST PAPER AWARD

A framework for the design, implementation and evaluation of a multi-variant Augmented Reality application

Sophie Westfahl
University of Applied Sciences Neu-Ulm, Germany

Dany Meyer-Renner, University of Applied Sciences Neu-Ulm, and
Antoine Bagula, University of the Western Cape, South Africa

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1st ex-aequo
BEST PAPER AWARD

The knowledge graph as the interoperability foundation for an Augmented Reality application: The case at the Dutch Land Registry

Alexandra Rowland and **Erwin J.A. Folmer**
University of Twente & Kadaster, The Netherlands

Tony Baving
Kadaster, The Netherlands

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1st ex-aequo
BEST PAPER AWARD

Enhancing user experience in pedestrian navigation based on Augmented Reality and landmark Recognition

Dhananjay Kumar

Anna University, MIT Campus, Chennai, India

Shreayaas Iyer, ***Easwar Raja*** *and* ***Ragul Kumar***, *Anna University, India*

Ved P. Kafle, *National Institute of Information and Communications Technology, Japan*

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6 YOUNG AUTHOR RECOGNITION CERTIFICATES

- **Zicheng Wang** and **Yetong Wang** (Inspur Communications Technology Co., Ltd., China) - S1.2 Towards computing and network convergence: QoE-oriented service anycast based on SRv6
- **Sophie Westfahl** (University of Applied Sciences Neu-Ulm, Germany) - S2.1 A framework for the design, implementation and evaluation of a multi-variant Augmented Reality application
- **Alexandra Rowland** (University of Twente & Kadaster, The Netherlands) - S2.3 The knowledge graph as the interoperability foundation for an Augmented Reality application: The case at the Dutch Land Registry
- **Xiangyu Qu** (Zhejiang Dahua Technology Co. Ltd, China) - S3.2 Research and standardization requirements for 5G network peak control technology in video transmission
- **Mfundo A. Maneli** (University of the Western Cape, South Africa) - S3.3 A comparative analysis of Augmented Reality frameworks aimed at diverse computing applications

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Video demonstration track

7-9 December 2022
Accra, Ghana

Agasthya Gangavarapu

Safety4XR

Making extended reality safe and secure for teenagers with ParGuard

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CONGRATULATIONS!!!

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CLOSING REMARKS

Director of Telecommunication Standardization Bureau, ITU

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Chaesub Lee

TSB Director

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Our sincere THANKS goes to...

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REPUBLIC OF GHANA

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Kwame Baah-Acheamfuor, Ministry of Communications and Digitalisation, Accra, Ghana

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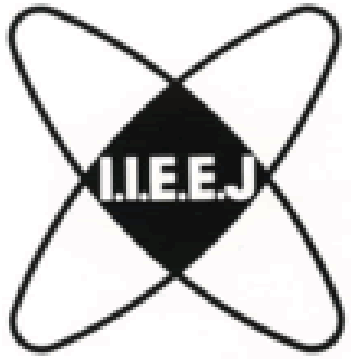

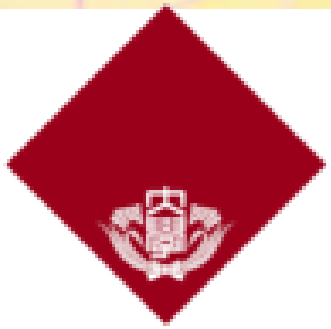

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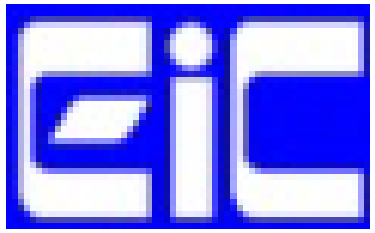

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SPECIAL THANKS

Alessia Magliarditi

ITU Kaleidoscope Coordinator

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Nii Ogbamey Tetteh

Selasie Kwabla Awagah

Emmanuella Godlove Osei

Agyeman Osei Tutu

Sarata Omane

Jacqueline Lartey

Doris Tawiah Nartey

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THANK YOU

GHANA

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