Selected ICT topics from quantum communications to personalized speech synthesis

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INFOCOMMUNICATIONS Journal covers a broad area of the scientific and engineering spectrum. The current issue is a demonstrative example of this, where topics of quantum communications, software defined networking, software defined radio, blockchain-supported decentralized authentication, IPv6 transition technologies (and their implementation benchmarking), personalized text-to-speech, interference of nationwide deployments for ICT technologies, the traveling salesman problem or microservice-based engineering process optimization of industrial IoT fields get presented together.

Let us have a brief overview of the articles included in the third 2022-issue of the Infocommunications Journal.

First, one of the most interesting topics of recent years, the road to Quantum Communications is visited by Daryus Chandra and his colleagues. Their overviews and discussions provide an easy-reading discourse (as they put it), requiring no deep knowledge of the topic. They clearly describe some of the most important challenges and open problems for the coming years. These include creating low-complexity yet powerful short codes for quantum error-correction, connecting medium-sized quantum computers to solve problems connected to quantum search, factorization, and optimization, and further addressing the various challenges that come with the birth of such Quantum Internet.

Following the Quantum line of thought (if there is such a thing), Suadad S. Mahdi and Alharith A. Abdullah propose a hybrid quantum key distribution protocol to enhance the security of SDN and network slices. The SDN control plane – and particularly the openflow channel – is prone to attacks that could have serious effects on the overall transmission and data security. The authors propose a solution that uses a hybrid key consisting of classical and quantum key distribution protocols to provide double security depending on the computational complexity and physical quantum properties.

Software Defined Radio (SDR) is an essential building block of modern communications. Dimitrie Popescu and Rolland Vida provide a comprehensive introduction to the wolds of SDRs, from their technological advancements through the theoretical background to the current SDR architectures and platforms. Their paper illustrates some typical features and applications of SDRs through two case studies.

Hafida Khalfaoui, Abderrazak Farchane, and Said Safi present a novel, BCT (blockchain technology)-based decentralized authentication mechanism for mobile ad-hoc networks. Their approach builds on the cryptographic characteristics of BCT, and they utilize fog computing to ensure communication between admins by delivering the update of blockchain anytime nodes are added to the network.

Next, Omar D'yab presents a comprehensive survey on IPv4 as a Service transition technologies and the performance of five important, comparable implementations: 464XLAT, Dual-Stack Lite, Lightweight 4over6, MAP-E, and MAP-T. These technologies appear in several different products and tools that the paper also describes, leading to the most comprehensive overview of the domain to date.

A related article by Ahmed Al-hamadani and Gábor Lencse details the benchmarking of MAP-T devices, a distinguished implementation of IPv6 transition technologies, standardized by RFC 8219. The authors built a tester, discussed its capabilities in detail, and showed the results of a testbed for validation.

In their paper, Ali Raheem Mandeel, Mohammed Salah Al-Radhi, and Tamás Gábor Csapó conducted detailed experiments for adaptive speaker text-to-speech (TTS) synthesis in which they have limited training samples regarding the target speaker. Their results presented the experiments for finding the minimum dataset and training period required to construct a TTS model with an unseen target speaker's dataset. Their results provide deep foundations for those who build applications with personalized text-to-speech synthesis.

Following the stream of comprehensive tutorial and survey articles in this issue of the Infocommunication Journal, Hussein Taha, Péter Vári, and Szilvia Nagy discuss the challenges related to the interference of cable television networks and mobile/fixed communication networks. They conclude by proposing measures for reducing or mitigating such mutual interference effects.

A topic of general interest – namely, searching for the optimal solution to the traveling salesman problem – is discussed in the next paper by Ali Jawad Ibada1, Boldizsár Tüű-Szabó, and László T. Kóczy. They investigated the effect of the initial population construction on Discrete Bacterial Memetic Evolutionary Algorithm applied to the problem and found that the Circle Group Heuristic gives better results than other well-known heuristic tour construction methods.

Germar Schneider and his colleagues present their recent results on the sensor integration efficiency of the micro-service-based approach by Eclipse Arrowhead, applied in the semiconductor industry. Besides describing the solution in general, they demonstrate its applicability through use-cases. They show that significantly fewer human resources must be utilized with this micro-service-based process engineering approach.

With this brief overview, we wish you a pleasant read – or deep study – of the current Infocommunications Journal issue.

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