Impactful Surveys for the 70th Anniversary of HTE

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The impact of a scientific achievement is hard to measure, especially in the short run. Still, human lifespan is relatively short when compared to the wide spread applications of theoretical breakthroughs – so we define "factors" predicting the possible impact of new ideas and contributions.

Scientific surveys are considered a strange breed of articles, since it is not necessarily expected from them to present and validate novel ideas. They contribute to the fabric of human knowledge and recognition of the world around us in another way. Providing a pre-digested, comparative, comprehensive overview about the current achievements of a domain could be just as eye-opening for some, as a clear description of brand new findings.

This is the first year of a new decade for the Infocommunications Journal, and indeed, we can be proud of some impactful articles published in the first ten years. This year is remarkable for HTE, the Scientific Association for Infocommunications, our publisher, as well. HTE has been formed in the January 29, 1949, in Hungary – hence celebrating its 70th anniversary this year. The intention with this current issue is to start the new decade with some impactful overviews – surveys – and some breakthrough articles carrying novel ideas.

The seven papers of this issue includes three invited surveys and four papers that arrived to the open call. The invited papers cover three very current areas of the ICT domain: hacking of IoT (Internet of Things) devices, and surveys on Quantum Key Distribution (QKD) and Visible Light Communication (VLC). Papers from the open call are also targeting current interest: 5G networks, V2G (Vehicle to Grid) communications, IEEE 802.11ax, and advanced compression and indexing methods for massive data. Let us have a brief overview of these papers.

In their primer paper, Papp et.al. provide an introduction into hacking IoT devices. After introducing the basic background on the interfaces and the protocols at the hardware level, they summarize the methods and tools for extracting the firmware of the device and unpacking it for further analysis. Further, they give an overview on some basic firmware analysis methods and tools that can be used to find hard-coded passwords and keys, and to discover erroneous settings or bugs. Moreover, they describe some more advanced analysis methods that can be used to discover vulnerabilities in the binary programs that belong to the firmware.

Gyongyosi et.al. furnish a synopsis of the recent results of QKD. Their review focuses on the principles of discrete-variable and continuous-variable QKD (DVQKD and CVQKD) protocols, the main attributes of the recent implementations, as well as the integration of QKD into traditional and quantum communication networks.

Upon editorial request, Eszter Udvary created a comprehensive literature overview on Visible Light Communication, covering its features and applications. VLC has the potential to provide high-speed data communication with relatively good security and improved energy efficiency. After introducing the motivation for VLC technology development, the paper describes the main advantages and disadvantages of this technology, demonstrates the current challenges, discusses modulation techniques and finally, VLC applications.

Racz et.al. investigate the performance of the closed-loop control of an UR5 industrial robotic arm at varying network characteristics. They evaluated the differences of the intended and the realized trajectories of the arm, and correlated this with communication speed and latency. Further, they suggest a method to handle loss and jitter of robot control packets.

In their paper, Jako et.al. present a wireless authentication solution prototype, which allows electric vehicle owners to identify themselves nearby the charging station, but before connecting the plug to the Electric Vehicles. They built a conformance test system for the Supply Equipment Communication Controller in accordance with the ISO/IEC 15118 standards.

Islam and Kashem propose an OFDMA-based MAC protocol for IEEE 802.11ax named HTFA, which employs a hybrid mechanism for channel access. HTFA will provide high throughput of data as well as maintains improved fair access policy to the medium among the terminals.

A data structure is called (singly) opportunistic if it takes advantage of the redundancy in the input in order to store it in information-theoretically minimum space. Nagy et. al. propose R3D3 as a new tool for compressing and indexing bitvectors. R3D3 is, in contrast to previous work, doubly opportunistic, in that it realizes substantial space savings on the compressed data and the index alike.

Seventy years for our Association, and ten years for our Journal – this is a year for celebration: remembering some legendary achievements, and aiming for new challenges.

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