

Signal processing, MIMO and 5G business opportunities – hear the latest in Infocommunications

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THE wide scope of Infocommunications Journal is presented in the current, 2020 autumn issue. Unlike the previous special issues this year, readers with wide range of interest find articles in various topics: from signal processing through RFID anti-collision method comparisons, and about an application for educating children on ear protection. As 5G keeps being the hot topic in applied Infocommunications, our journal provides room for disseminating the latest results in this area, repeatedly.

The following paragraphs provide brief overviews of these papers.

In their paper, Kalshchikov, Shtykov, and Smolskiy show a possibility to use the wideband chirp pulse signals in systems of ground penetrating radar sensing under conditions when the concept of the group delay time of the sensing pulses cannot be applied. The proposed signal processing method – that can also be spread to tasks related to the elastic wave propagation – allows the essential reduction of the influence of the frequency dispersion of medium properties upon an accuracy of the object position determination. There could be practical interest for the method when using wideband chirp pulse signals at the presence of medium dispersion. This paper appears within very sad circumstances, since one of the authors, Sergey M. Smolskiy has passed away before its publication.

In their study, Jing, Luo, Chen and Xiong provided a comparative analysis regarding blind anti-collision methods for RFID systems. While the RFID technology is becoming key in various Internet of Things scenarios, its actual development towards better performing equipment should be faster. Although the tags in RFID systems are more and more utilized, all they communicate in the same channel. The reader receives mixed signals, from which the reader cannot always separate the proper message. Such collisions are the main obstacles of RFID system scalability; against which various methods are available – and compared in this article.

Even though hearing is an important sense for humans, we tend to under-estimate effects of destructive stimuli our ears receive. Education on noise awareness is really important, so Szántó, Jenei, Tulics and Vicsi present their results of the "Protect our Ears" project. Playing with heir web application helps children to be more aware in protecting their hearing. Their study shows that children in the test group playing with the web application became more aware of the noise in their surrounding and mastered preventive behavior.

János Ladvánszky investigates synchronization and equalization of 2x2 MIMO signals in his article – making a step further than the related state-of-the-art patent of theirs. The Costas loops used for frequency synchronization fitted the problem very well, and as a result, the standing constellation diagrams appear fast in the output, and remain almost constant for the rest of the measurement interval. Since the input data were real measurements, the analyses here serve as experimental verification, as well.

In their survey paper, Soós, Ficzer, Seres, Veress and Németh describe the business opportunities for non-public 5G cellular networks and evaluate them. They approach the fundamental aspects of 5G's business potential from the aspects and requirements of the Industry 4.0 revolution. They present innovative, 5G-based industrial architectures – and their application benefits through the looking glasses of industrial production and logistics stakeholders, telecommunication equipment vendors, as well as network operators.

As massive MIMO is a key technology in modern cellular wireless communication systems, extremely large aperture arrays are planned to be used in 5G as well. Csathó, B. P. Horváth and P. Horváth present the modeling of the near-field for such extremely large aperture arrays. They compare one- and two-dimensional array models, different antenna element models and antenna geometries through various key design parameters in their model. Among other findings they reveal that by choosing spectral-efficiency as a design objective, the size of the aperture is a critical design parameter.

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