Editor
Valeri Mladenov

Recent Advances in Circuits, Systems, Signal Processing & Communications

Proceedings of the 10th International Conference on Circuits, Systems, Signal and Telecommunications (CSST '16)

Barcelona, Spain, February 13-15, 2016

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Preface

This year the 10th International Conference on Circuits, Systems, Signal and Telecommunications (CSST '16) was held in Barcelona, Spain, February 13-15, 2016. The conference provided a platform to discuss microelectronics, nonlinear circuits, superconductivity circuits, systems theory, control systems, adaptive filters, signal reconstruction, expert systems, antennas and radars, optical fiber systems, communication electronics etc. with participants from all over the world, both from academia and from industry.

Its success is reflected in the papers received, with participants coming from several countries, allowing a real multinational multicultural exchange of experiences and ideas.

The accepted papers of this conference are published in this Book that will be sent to international indexes. They will be also available in the E-Library of the WSEAS. Extended versions of the best papers will be promoted to many Journals for further evaluation.

Conferences such as this can only succeed as a team effort, so the Editors want to thank the International Scientific Committee and the Reviewers for their excellent work in reviewing the papers as well as their invaluable input and advice.

The Editors

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Plenary Lecture 1

Fast Iterative Unbiased FIR Filtering with Applications

Professor Yuriy S. Shmaliy
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Abstract: Fast optimal state estimation in diverse environments is a key problem for many branches of science and engineering. However, not each estimator demonstrates sufficient robustness against uncertainties under the unknown noise statistics. In this lecture, we consider a novel estimation technique called unbiased finite impulse response (UFIR) filtering which has several advantages against the traditional Kalman filter (KF). The UFIR filter has better robustness against temporary model uncertainties, higher immunity against errors in the noise statistics, and smaller round-off errors. Unlike the KF, the UFIR filter completely ignores the noise statistics. Instead, it requires an optimal averaging horizon of Nopt points in order to minimize the mean square error (MSE). Therefore, the iterative UFIR filtering algorithm using recursions has manifested itself as a strong rival to KF. It is shown that Nopt can be specialized via measurements with much smaller efforts and cost than for the noise statistics required by the EKF. Overall, the UFIR filter is more successful in accuracy than the KF under the uncertain conditions. Extensive investigations of the approach are provided in applications to diverse linear and nonlinear systems. For example, better performance of the UFIR filter has been demonstrated when the noise statistics are not known exactly in applications to indoor mobile robot self-localization in radio frequency identification (RFID) tag environments.

Brief Biography of the Speaker: Dr. Yuriy S. Shmaliy has been a full professor in Electrical Engineering of the Universidad de Guanajuato, Mexico, since 1999. He is now a visiting professor in City University London. He received the B.S., M.S., and Ph.D. degrees in 1974, 1976 and 1982, respectively, from the Kharkiv Aviation Institute, Ukraine. In 1992 he received the Dr.Sc. (technical) degree from the Kharkiv Railroad Institute. In March 1985, he joined the Kharkiv Military University. He serves as full professor beginning in 1986 and has a Certificate of Professor, since 1993. In 1993, he founded and, by 2001, had been a director of the Scientific Center “Sichron” (Kharkiv, Ukraine) working in the field of precise time and frequency. His books Continuous-Time Signals (2006) and Continuous-Time Systems (2007) were published by Springer, New York. His book GPS-based Optimal FIR Filtering of Clock Models (2009) was published by Nova Science Publ., New York. He also edited a book Probability: Interpretation, Theory and Applications (Nova Science Publ., New York, 2012) and contributed to several books with invited chapters. Dr. Shmaliy has authored 375 Journal and Conference papers and holds 81 patents. He is IEEE Fellow; was rewarded a title, Honorary Radio Engineer of the USSR, in 1991; was listed in Outstanding People of the 20th Century, Cambridge, England in 1999; and was granted with the Royal Academy of Engineering Newton Collaboration Program Award in 2015. He currently serves on the Editorial Boards of several International Journals and is a member of the Program Committees of various Int. Symposia. His current interests include statistical signal processing, optimal estimation, and stochastic system theory.

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Plenary Lecture 2

Building Cyber Trust for Functions Vital to Society

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Abstract: Functions vital to society, such as critical infrastructure protection, healthcare and public protection and disaster relief, are increasingly dependent on networks, electricity and data processing infrastructure. Incidents such as natural hazards, infectious disease epidemics and organized crime do not respect national boundaries. As a consequence, there is an increased need for European collaboration and information sharing related to critical communications and information exchange technologies and procedures. However, “trust” could be seen as the most important issue with regard to multi-agency cooperation. Cyber security should be seen as a key enabler for the development and maintenance of trust in the digital world. It is important to complement the currently dominating “cyber security as a barrier” perspective by emphasizing the role of “cyber security as an enabler” of new interactions and services - and recognizing that trust is a positive driver for growth. Functions vital to society are becoming more and more dependent on unpredictable cyber risks. Everywhere present computing means that organizations ensuring functions vital to society do not know when they are using dependable devices or services and there are chain reactions of unpredictable risks. If cyber security risks are not made ready, these organizations will face severe disasters over time. Investing in systems that improve confidence and trust can significantly reduce costs and improve the speed of interaction. From this perspective, cyber security should be seen as a key enabler for the development and maintenance of trust in the digital world.

Brief Biography of the Speaker: Jyri K. Rajamäki is currently a Principal Lecturer in Information Technology at Laurea University of Applied Sciences (UAS), Finland. He is an Adjunct Professor of Critical Infrastructure Protection and Cyber Security at the University of Jyväskylä. Dr. Rajamäki worked ten years (1986-1996) for Telecom Finland, main tasks being uninterruptible power supplies, electromagnetic compatibility (EMC), and electromagnetic pulse protection. From 1996 to 2006, Dr. Rajamäki acted as Senior/Chief Engineer for Safety Technology Authority of Finland where his main assignment was to make the Finnish market ready for the European EMC Directive. Dr. Rajamäki was 17 years the secretary or a member of Finnish national standardization committee on EMC, and he represented 15 years Finland at IEC, CISPR, CENELEC and ETSI EMC meetings. He was the Chairman of Finnish Advisory Committee on EMC from 1996 to 2006. Since 2006, Dr. Rajamäki has been the head of Data Networks Lab of Laurea UAS. Dr. Rajamäki has been the scientist in charge, national coordinator and scientific supervisor for several national and European research projects. For the European Research Area he has acted as the evaluator of the projects. He is currently an advisor board member of the HARMONISE (A Holistic Approach to Resilience and Systematic Actions to Make Large Scale Built Infrastructure Secure) FP7 Project. His current research interests are resilient cyber-physical systems, and overall governance (generation, transmission, storage, processing, sharing, collective use, deletion) of safety critical and/or classified information. Dr. Rajamäki has authored more than 150 scientific publications. Dr. Rajamäki holds M.Sc. degree (1991) in electrical engineering from Helsinki University of Technology, Lic.Sc. (2000) and D.Sc. (2002) degrees in electrical and communications engineering from Helsinki University of Technology, and PhD degree (2014) in mathematical information technology from University of Jyväskylä.

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Plenary Lecture 3

Some Newer Fading Distributions and Analysis of their Influence to the Performance of Wireless Telecommunication Systems

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Abstract: In wireless communications systems, one of the most serious problems is fading caused because of multipath propagation. When a received signal experiences fading during transmission, the signal envelope fluctuates over time. Consecuently, fading is modeled as a random process. There is a wide range of statistical models for fading channels. Their accuracy depends on propagation environment and communication scenario. The most frequently used distributions in the available technical literature are Rayleigh, Rician and Nakagami-m. Recently, Weibull, Hoyt, α-μ, k-μ, and ?-μ distributions have also obtained some interest. Under such conditions, the closed form expressions for probability density function (PDF), cumulative distribution function (CDF) and moments are calculated. Also, the statistics of product, ratio, maximum and minimum of two random variables are studied. The influence of parameters of these distributions on statistics of the product, ratio, maximum and minimum of two random variables is analyzed.
Further, submitted results help the designers of wireless communication systems to simulate different wireless environments and configure system parameters in order to meet the Quality of Service (QoS) demands using the outage probability as important and widely accepted performance measure.

Brief Biography of the Speaker: Dragana S. Krstic was born in Pirot, Serbia. She received the BSc, MSc and PhD degrees in electrical engineering from Department of Telecommunications, Faculty of Electronic Engineering, University of Nis, Serbia, in 1990, 1998 and 2006, respectively. Her field of interest includes telecommunications theory, wireless communication systems, satellite communication systems etc. She works at the Faculty of Electronic Engineering in Nis since 1990. She participated in more Projects which are supported by Serbian Ministry of Science. She has written or co-authored about 200 papers, published in Journals and at the International/National Conferences. She has also reviewed many articles in IEEE Transactions on Communications; IEEE Communications Letters; ETRI journal; C&EE Journal; Elektronika ir Elektrotechnika and other well known journals. She is the reviewer of the papers for hundreds conferences and the member of technical program committees and international scientific committees of many scientific conferences. Also, she is the member of Editorial Board or Associated Edotor of several journals: International Journal on Advances in Telecommunications, WSEAS Transactions on Communications, International Journal of Communications.

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