Guest Editorial Signal Processing for Wireless Communications I

I. Introduction

SIGNAL processing techniques, such as equalization, detection, and fast Fourier transform, have been successfully used in communication systems to improve the quality of communications. With the recent exploding research interest in wireless communications, the application of signal processing to this area is becoming increasingly important. Indeed, it is the advances in signal processing technology that make most of today's wireless communications possible and hold the key to future services. The application of signal processing techniques to wireless communications is an emerging area that has recently achieved dramatic and important results and holds the potential for even greater results in the future as an increasing number of researchers from the signal processing and communications areas participate in this expanding field.

From an industrial viewpoint, advanced signal processing technology cannot only dramatically increase wireless system capacity, but can also improve communication quality, including the reduction of the effects of all types of interference. As an example, a recent field test by Lucent Technologies demonstrated that adaptive signal processing for antenna arrays can be effectively used in mobile communication systems to mitigate cochannel interference and increase system capacity, setting a milestone for signal processing in wireless communications.

The IEEE JOURNAL ON SELECTED AREAS IN COMMUNICATIONS on Signal Processing for Wireless Communications presents 43 papers, in two issues, on diversity and antenna arrays, blind techniques, orthogonal frequency division multiplexing (OFDM)-related techniques, equalization and signal detection and multiuser detection, and code division multiple access (CDMA)-related techniques. This issue contains 21 papers on the following three topics.

II. Diversity and Antenna Arrays

The first two papers deal with adaptive arrays. The paper by Molnar and Bottomley proposes a joint maximum likelihood sequence estimation and adaptive array receiver, while the paper by Wang and Poor investigates a robust adaptive array to improve the quality of cellular systems.

The next five papers consider the combination of antenna arrays with equalization for wireless systems with delay spread. The papers by Ng *et al.* and by Lee and Cox apply decision-feedback equalization with antenna arrays. The paper by Clark proposes frequency-domain equalization with diversity reception. The papers by Martone and by Affes and Mermelstein investigate fourth-order statistics with minimum mean squared error arrays for time division multiple access (TDMA) systems and a spatial-temporal receiver for CDMA systems, respectively.

The last four papers study transmitter diversity. The paper by Narula *et al.* studies the use of side information to improve transmit diversity systems. The paper by Rashid-Farrokhi *et al.* proposes a transmitter and receiver space–time diversity approach for wireless networks. The papers by Alamouti and by Naguib *et al*. study transmitter diversity using space block coding and space-time coding, respectively, for high-data-rate wireless communications.

III. Blind Techniques

Blind techniques have been studied for over 20 years. Interest in these techniques for wireless systems, however, has been increasing recently. We present seven papers on this topic.

The first two papers by Boss *et al.* and by Ding and Li investigate blind channel estimation for TDMA systems using higher and second-order statistics, while the paper by Xavier *et al.* proposes a closed-form identification algorithm for SDMA systems. The papers by Chugg and by Ulukus and Yates study blind techniques for sequence and decorrelation detection, respectively. Blind techniques can also be applied to beamforming and adaptive arrays, as shown in the papers by Ghazi-Moghadam and Kaveh and by Yao *et al.*, respectively.

IV. OFDM Related-Techniques

OFDM, i.e., multicarrier modulation, is an effective technique to combat multipath fading in wireless environments. This issue has three papers on this topic. The paper by Luise *et al.* applies a blind approach to equalization and detection of OFDM signals. The paper by Kozek and Molisch investigates a new set of nonorthogonal basis functions for robust and efficient multicarrier systems. The paper by Kim and Stüsber deals with intersymbol interference cancellation for OFDM systems in high-definition television broadcasting.

Acknowledgment

The Guest Editors received a very large number of submissions and many good quality papers could not be accepted. They would like to thank the authors for their submissions,

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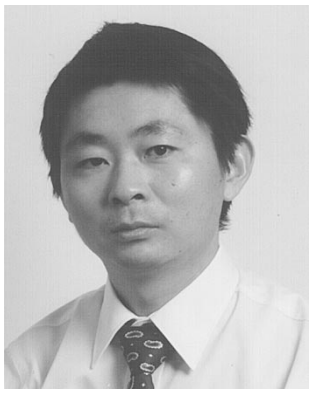

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From 1986 to 1991 he was a Teaching Assistant, and later a Lecturer, at Southeast University, Nanjing, China. From 1991 to 1994 he was a Research and Teaching Assistant with Auburn University. From 1994 to 1996 he was a Post-Doctoral Research Associate at the University of Maryland, College Park, MD. Since 1996 he has been with AT&T Labs-Research, Red Bank, NJ. His general research interests include statistical signal processing and wireless mobile systems, with emphasis on signal processing in communications.

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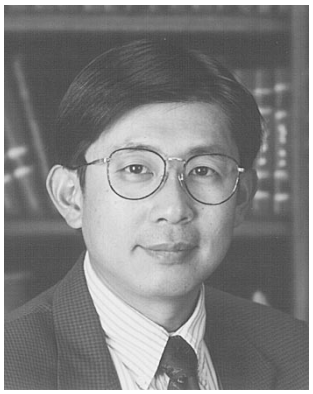

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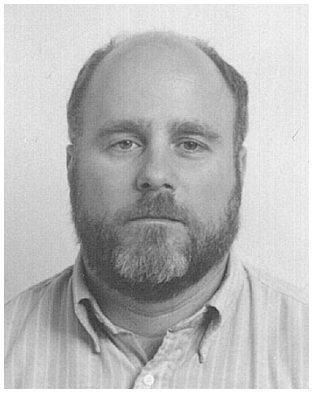
Dr. Liu has received numerous awards, including the 1994 National Science Foundation Young Investigator Award, the IEEE Signal Processing Society's 1993 Senior Award (Best Paper), the 1994 George Corcoran Award for outstanding contributions to electrical engineering education, and the 1995–96 Outstanding Systems Engineering Faculty Award in recognition of outstanding contributions in interdisciplinary research. He has been an Associate Editor of the IEEE TRANSACTIONS ON SIGNAL PROCESSING. He was a Guest Editor of special issues on multimedia signal processing and technology of the PROCEEDINGS OF THE IEEE, a founding member of the Multimedia Signal Processing Technical Committee of the IEEE Signal Processing Society, and is Technical Cochair of the IEEE International Multimedia Signal Processing Workshop to be held in Copenhagen, Denmark.



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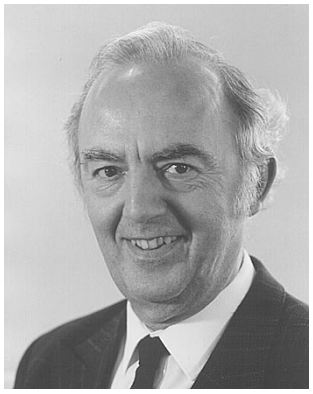

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Dr Andersen is a former Vice-President of URSI. He is on the editorial board of *Wireless Information Networks and Wireless Personal Communications*, and Associate Editor for wireless communications of the IEEE TRANSACTIONS ON ANTENNAS AND PROPAGATION. He has twice served as Guest Editor of the IEEE JOURNAL ON SELECTED AREAS IN COMMUNICATIONS. He was President of the Second World Congress on Electricity and Magnetism in Biology and Medicine, held in Bologna, Italy in June 1997.